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ABSTRACT

This bulletin is published annually in the interest of children with learning disabilities, language disabilities, or dyslexia. Specific topics covered in the 17 articles include: the effect of student failure on the quality of family life and community mental health; selecting initial reading instruction for high-risk children; the relationship of dyslexia and learning disabilities; metalinguistic awareness and reading strategies; limerence (love), language, and literature; comprehension, recall, and dyslexia; reading behavior in dyslexia; dyslexia and sequential order errors in reading; psychological evaluation of specific learning disorders; developmental dyslexia in adolescents; case studies of three dyslexic children; evaluation of oral language disorders in children; language competency, dyslexia, and learning disability; memory and mental images in verbal deficit modification; and orientation dyslexia. (FL)

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BULLETIN OF THE ORTON SOCIETY

AN INTERDISCIPLINARY JOURNAL OF SPECIFIC LANGUAGE DISABILITY

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BULLETIN OF THE ORTON SOCIETY

Volume XXVIII, 1978

Editor: Alice Ansara *Consulting Editor:* Margaret B. Rawson
Managing Editor: James Silvan

Foreword

At the first annual meeting of the Orton Society, after its founding in 1949, a scientific paper was presented by Dr. Lauretta Bender. Along with excerpts from a discussion by a panel of doctors and educators, this paper was included in the proceedings of that meeting that were published, for the benefit of the Society's members, as the first *Bulletin of the Orton Society*. Thus, small in volume but with content of no mean magnitude, the *Bulletin* was launched and its course charted. That course is best described in the words of the *Bulletin's* first editor, the late June Lyday Orton, as ". . . bringing to its readers scientific papers on the medical, psychological, and educational aspects of specific language disability." By 1964, when she retired as editor, Mrs. Orton's grasp of the broad dimensions of specific language disability had resulted in the inclusion, in the still slim volumes of the *Bulletin*, research reports and book reviews on topics that only more recently have come to the fore as major concerns of investigators into reading and language behaviors, disorders, and dysfunctions.

When Margaret Byrd Rawson succeeded June Orton as editor, she brought to the task the experience, knowledge and scholarship that enabled her to take the *Bulletin* from its firmly established base into a period of expansion. That expansion took several forms, the most important of which were: a wider range of contributors, international as well as national; more reports on basic research, as well as on application of theory; and a readership broadened far beyond the Society's rapidly increasing membership. Current literature makes frequent reference to authors whose articles have appeared in the *Bulletin*; and the reprints of its articles, now nearing 100 in number, are in constant demand. Indeed, *specific language disability* and *dyslexia* are no longer controversial terms or viewed as the invention of

a "cultist" group, as they were by some in the *Bulletin's* infancy, and Margaret Rawson's contribution toward the understanding and acceptance of the concept is no small one.

That dyslexia is now a matter of national concern and demands the serious attention of researchers, educators, and the government is no longer a matter of dispute. Evidence of that concern may be seen in this issue's article by Thomas E. Bryant, "The Effect of Student Failure on the Quality of Family Life and Mental Health," included in the Report to the President from the President's Commission on Mental Health. The tragic story of Robin, told in the article by his mother, Florence E. Jones, and the emotional carnage among dyslexic adolescents, described by Carl L. Kline in another article, poignantly underscore Dr. Bryant's thesis and lend a note of urgency to the need for appropriate classroom instructional strategies for young children at risk for school failure. Helen M. Popp's article, "Selecting Initial Reading Instruction for High Risk Children: a Theoretical Approach," and her research in a public school setting address that need. Given appropriate attention at an early enough age, needless suffering can be avoided; Margaret Rawson demonstrated this in her retrospective study, *Developmental Language Disability: Adult Accomplishments of Dyslexic Boys* (The Johns Hopkins University Press, 1968). But too few today receive that attention and too few, as Richard Strauss points out in his article, have the compensatory circumstances and understanding that enabled him to build a successful life despite unrecognized and unremediated dyslexia. Appropriately, therefore, the focus of other articles is on some of the important, still unanswered questions about the nature of dyslexia and its manifestations. These are questions that must be answered if we are indeed to circumvent student failure and its serious consequences.

I wish to express my appreciation to the contributors who made this issue possible and to thank the *Bulletin's* managing editor, Dr. James Silvan, for his guidance through the complicated process of publication in my first year as editor. I am especially grateful to Margaret Rawson for consenting to serve as consulting editor.

Alice Ansara, Editor

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The Samuel T. Orton Award for 1977

Presented by The Orton Society to

Aylett R. Cox

Presentation by Sally B. Childs

It is a unique privilege for me to have been selected by The Orton Society to present its highest tribute—The Samuel T. Orton Award for 1977. It is my responsibility to present the recipient to you as both a person and a professional. Here in Texas and especially in Dallas where she was born, she is already well known; but the larger audience of The Orton Society and

the educational world need to know her better. I give you Aylett Royall Cox, worthy follower in the train of previous distinguished recipients of this honor and hereafter known as AC (as Anna Gillingham was known as AG).

Aylett Cox is the daughter of the late Mr. and Mrs. J. W. Royall and the third generation of her family in Dallas. After her graduation from elementary school with honors, her parents sent her to The Hockaday School because they thought a superior high school education was important for girls. After graduating there in 1932, she attended Southern Methodist University and received her B.A. from the University of Texas (in 1936) where she majored in English. She married George Cox, a Dallas independent insurance agent; had three children, two boys and a girl; and did all the usual things young matrons in bankers' families do, such as teaching Sunday school, being a den mother, being active in Junior League work and other service organizations.

As her own children grew older and the usual round became less interesting, her interest in helping children led her into unexpected paths. In 1958 when she was urged to "help" a boy who had been diagnosed as dyslexic, she consulted Herbert W. Smith, then Headmaster of Hockaday. Fortunately for all concerned, Herbert Smith was a long-time friend and supporter of Anna Gillingham and her work in behalf of children with specific language disability. He knew that Anna Gillingham had established a program to help such children at the Barstow School in Kansas City and had trained teachers for them there. So he recommended that Mrs. Cox commute to Kansas City for this training and teach the boy herself. After initial reluctance she agreed to do this and thus forged the first link in the chain which was to bind her to a distinguished career in the field of language therapy and lead us to this platform.

The next link was added when a fellow Hockaday alumna determined that the school should have a language training program and consulted with Mrs. Cox. They enlisted the cooperation of Robert Lyle, the new Headmaster of Hockaday and former head of the Sidwell-Friends School in Washington, D.C., where Lyle had persuaded Anna Gillingham to establish a pioneering language training program. They also discovered that Lucius Waites, M.D., a pediatric neurologist familiar with the problem of dyslexia, had recently come to Dallas. He would provide the medical and interdisciplinary evaluations required for diagnosis. At this point, as Anna Gillingham's designated successor, I was approached to train the teachers who would be needed to teach the children so diagnosed. Mrs. Cox, nearing the end of her Kansas City training, would work closely with me.

From the beginning she made a major contribution to the pioneering venture, selecting the teachers for training, matching them constructively with the students who had been diagnosed as needing our help, handling all the problems involving parents, schools, and the community. She was uniquely fitted by temperament and background to deal with the crucial aspects of any new language training program, especially in 1962 in a city where the problem had not as yet been identified. Her genius for human relations was a major factor in the success and expansion of the program. Never before had any training center for this work trained so many teachers at one time in a full two-year course which included content from all the related fields, as well as supervised practice teaching. As time went on, she took over more and more of the organization and responsibility for the course. Within that ideal limit of five years which predicts a viable program, she assumed full direction of the teacher training and language therapy programs and I phased out. I am convinced that she has done a better job than I could have in achieving the training program's present excellence in cooperation with the other sections of the total operation. During the first 15 years, the program has trained hundreds of teachers and provided assistance for thousands of children in its Center laboratory and supervisory programs.

As a professional, Aylett Cox's interests began to focus early. During her school years she studied speech and verbal expression at the Woodrow Wilson School of Speech and Drama, no doubt fostering the excellent diction and skill with words she now displays. At Barstow she trained under one of Anna Gillingham's outstanding teachers. She then had advanced training covering several years with me, during which she mastered the Childs Variations on Gillingham, was exposed to other efforts in the field and worked closely with me in developing techniques which made possible the training of large groups. She has gone on especially in this aspect of training teachers and children well beyond our earlier efforts. In 1970 she earned a Master's Degree in Special Education with a major in psychology as well as in special education. She is now going on to work for her doctorate in this area.

With this focusing on the problem of language therapy came responsibilities: Supervisor of the Language Training Department at Hockaday (1961-65); Associate Director of the Language Training Unit, Texas Scottish Rite Hospital at Dallas (1965 to date); and Director of Teacher Training, Dean Memorial Learning Center in Dallas (1975 to date). From the late 60's on, she has conducted numerous workshops, seminars and in-service

programs, beginning in Texas but soon ranging from coast to coast, from the Gulf to Canada. She began compiling and publishing materials for teacher training and the instruction of dyslexics. Through Educators Publishing Service and the *Bulletin of the Orton Society* these contributions are available to the public.

Long a member of The Orton Society, she served on the National Board from 1966 to 1975, was a founding member and board member of the Dallas Branch of the Orton Society, and its president in 1975–76. Despite these demands, she has kept up her membership in the Junior League Mortar Board and Kappa Kappa Gamma. Topping the list of various club and college honors, Aylett Royall Cox was the recipient earlier this year of the first Hockaday Medal given by the school's Alumnae Association to the alumna best exemplifying the school's ideals.

Offsetting this formidable professional accomplishment, it is a pleasure to report that the Cox family is a wonderful institution. During the Childs's long periods of residence in Dallas, they were adopted fully into its joys. The husbands (Ralph Childs and George Cox) are charter members of the Orton Auxiliary which includes John Slingerland, Joe McClelland and others who deserve the highest commendation for their forbearance and support through the years. The Cox children, now all married and having earned two and a part Ph.D.'s, also deserve sympathy and congratulations earned through their youth by all those "Orton Society Children" who shared their mother, or father, sometimes at first reluctantly but later proudly. Only those who have visited at the Cox's lakeside cottage or reveled in the relaxed hospitality of Rheims Place can really appreciate the quite extraordinary combination of true Southern warmth and welcome with the highest personal and professional ideals.

- For developing better training for teachers of dyslexics and materials for their instruction
- For improving the human lot by providing better techniques of communication
- For worthily carrying on the great Orton Society tradition of service to the language-disabled

The Orton Society presents its highest honor,
the SAMUEL T. ORTON AWARD, to

AYLETT ROYALL COX

Response
by Aylett R. Cox

I have a tingling, multisensory, unstructured reaction to the realization that the Orton Society is honoring me with the Samuel T. Orton Award. The mantle you are dropping on my shoulders honors a host of dedicated people, especially the students, teachers, and staffs at the Texas Scottish Rite Hospital and Dean Memorial Learning Center, Sally and Ralph Childs, Dr. William B. Dean, Robert Hall, Dr. Michael Murray, Dr. Lucius Waites, Robert Lyle, many loyal friends, and my very strongest support, George Cox. Together we must continue to grow toward the Orton-Award proportions of Dr. Macdonald Critchley, Dr. Lauretta Bender, Dr. Katrina de Hirsch, Margaret Rawson, June Orton, Sally Childs, Beth Slingerland, Dr. Lloyd Thompson, Roger Saunders, and Dr. Richard Masland. What a long way "we" have to grow!

This banquet contrasts sharply with my first Orton Society dinner in 1962. My mentor, teacher, and very dear friend, Sally Childs, was in Dallas that year initiating a teacher-training program at The Hockaday School and she was the current president of the Society. She insisted that I ought to "invade" New York to attend the annual meeting and I agreed, even though I was not quite sure what the Orton Society was or why she thought it was so important.

Seventy-five dedicated souls gathered that fall at the New York Academy of Sciences to sit all day on hard, folding chairs and listen to a succession of enthusiastic but tireless speakers. At six o'clock we walked several blocks together to a crowded, noisy restaurant where we ordered a quick meal before returning to our seats in the Academy for another series of programs which lasted far beyond 10:00 p.m. and our sitting endurance. I was exhausted but my head was spinning with excitement, for here at last was the burning dedication to excellence in education which I had been seeking. The speakers were talking my language (with a Yankee accent, of course). They spoke from various orientations on the recognition and treatment of specific developmental dyslexia and they seemed to agree generally on the meaning of the term.

But essentially every speaker agreed with our idealistic philosophy of education. They emphasized, as did we, the worth and talents of each individual and the urgent need to give every normal child a membership card to the human race, that is, access to written language. These

authorities recognized, as did we, that all capable children do not learn to read, write, and spell in the same way; that these skills must be interwoven and taught through auditory and kinesthetic pathways, as well as through the visual, to reach every kind of learner. Unlike previous speakers in my experience, they actually recommended synthesizing, multisensory phonics for beginning readers and the incorporation of handwriting, spelling, and oral language in the teaching of reading, especially for those children who have no talent for coping with written language—who cannot remember easily the way words look nor deduce the phonic regularities for themselves. They supported our conviction that access to the structure and science of written language can provide tools for such children when their "Xerox machines" break down. Hailing from the flatlands of Texas where *Look-say* was rampant and where I was a lone voice for phonics in the educational "wilderness," I could hardly believe my ears. Surely, I thought, this must be Heaven!

Education, The Orton Society, Texas, and I have come a very long way in fifteen years—but not far enough. Many capable children who cannot learn language skills the way they are taught in regular classrooms are still being thought of as lazy and careless. These students are limping through school and through life without the adequate tools of language—misfits in a highly linguistic society.

S. I. Hayakawa and Lincoln Barnett, among many others, have eloquently extolled the treasure of our mother tongue, a treasure which must not be withheld from any capable child in our culture. The great Indian chieftan, Sequoia, the only man in history who invented an alphabet singlehandedly, was brilliantly insightful when he recognized that the white man's power lay not in his guns but in his ability to communicate on paper. Can we blame a child who lacks this power for lashing out in bitter, resentful, unattractive or fighting behavior—even delinquency? The late Dr. Johnson O'Connor, an authority on vocabulary acquisition, noted that throughout history those who cannot communicate with words must, and often do, resort to fighting and violence. Not so great a threat, but an equally tragic loss to our civilization, are the "flight" children, those who timidly withdraw, lose self-confidence, and never reach their full potential or find their talents because they lack the skills to cope with written language.

The problem is world-wide and this was underlined by the Committee on World Illiteracy and Dyslexia when it met at the Scottish Rite Hospital in Dallas in 1968 to formulate a definition.

How grateful we must be to Dr. Orton for recognizing these "different" language learners back in the 1920's and for writing his prescription for their remediation in his enduring book, *Reading, Writing and Speech Problems in Children*, published in 1937. The disability now lies, not in the children, but in education. The educational system must begin to meet the individual child's learning needs rather than to continue to require the child to meet the system's needs.

How much longer must we in education delay before we face the problem in unison and heed the beat of Dr. Orton's different drum? May the Orton Society, standing on the shoulders of this remarkable giant, grow taller, stronger, and bolder in assuming leadership in this great crusade. May the flame which kindled my enthusiasm in New York, like the torch of the Olympic marathons, burn even brighter until all teachers everywhere ignite the spark of confidence in the heart of every kind of language learner. Surely the Orton Society is a magnificent idea whose time has come at last.

I am proud, happy, and humble to be honored with the Samuel T. Orton Award this night.

The Effect of Student Failure on the Quality of Family Life and Community Mental Health

Thomas E. Bryant, M.D., J.D.

Director, The President's Commission on Mental Health

You may ask: Why is Thomas E. Bryant, M.D., J.D., the Director of President Carter's Commission on Mental Health, speaking at a meeting to consider the problem of failure in school? The answer is: He is doing exactly what he is supposed to be doing, since he must be very much concerned about any problem or set of problems which has a direct, adverse effect on the mental health of families and therefore of communities. Certainly we know that often efforts by individuals and families to cope with a major disabling handicap of any kind can be vastly disruptive and destructive of family life, tearing at the very fabric of the family, draining—both emotionally and financially. Certainly we know that one of the most difficult handicaps in a literate culture is the inability to read, write, spell and compute adequately. We also know that a significant proportion of the total school population in our country—though not in our country alone—are too far below grade level and ability level in basic skills to be able to function in the classroom with their peers.

While it can be documented many times over, it is a matter of common experience that repeated failure especially in the face of great effort to learn and to do well is one of the most destructive and devastating experiences a child can have . . . so devastating in its effects that every member of the family sooner or later is marked by the consequences, often seriously.

The phrase "learning disability" comes up repeatedly in any discussion of school failure. The question is whether the best emphasis is on *disability* or on *learning*. Obviously, we are talking about learning. When a child has been in school for a year or more, and he is clearly *not* learning as the other

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This paper appeared in the Report of the Task Panel on Learning Failure and Unused Learning Potential, submitted to the President's Commission on Mental Health, 1978, Volume III, Appendix, pages 725–729, and also was presented as an address at the 28th Annual Conference of The Orton Society in Dallas, November 1977.

children are, we want to know: Is this child capable of learning? If so, what is the problem? How can he learn? What can be done to help him learn? If not, why can't he learn? What will become of him? How will the family cope with the problem? How will they provide for him?

In another sense we are asking: Can he succeed? Often, though not always, failure in school leads to failure in life. Failure is not good for children or other living things, as the saying goes. It is not good for the siblings or the parents of children who fail. It is not good for the communities in which they live.

No one will disagree that the feeling of failure breeds many other feelings—feelings of self-doubt and uncertainty, of guilt and shame, of resentment and the wish to blame, of rage and despair, of deep inadequacy and worthlessness, and of a general inability to cope adequately, sometimes even to cope minimally, with the demands of life in our society. Whether in individuals or in families, these are not feelings that make for optimal mental health.

The most devastating aspect of the experience of failure among children who learn differently from the majority is that they fail *in spite of their very best efforts* to work hard and to do well. They have tried in every way they know how. In the face of their daily defeat and despair, we must call their efforts superhuman. Quickly they learn one thing—that nothing they can do will bring them success in school. They learn that no matter what effort they expend, they will continue to fail.

Such children, recently called *The Puzzle Children*, have only a few options. Some become the Shadow Children, purposely fading into the background, hoping never to be noticed, praying that they will never be called on, waiting, passive, withdrawn and silent until somehow, miraculously, the torture of schooling is over for them. Others, unable to absorb their frustrations and contain their rage, first give vent to their feelings in small resistances and rebellions; stubbornness, "I won't, I don't want to, I hate it, You can't make me." As the child and the resentment and rebellion grow, the expression of feelings has far more difficult consequences to the family, to the community and, of course, to the child: terrible internal confusion, strife and conflict within the family; destructive and aggressive acting out in the neighborhood and at school, perhaps including physical assaults, vandalism, shop-lifting, and other petty and grand larceny, and on up the ladder (or down the path) which leads eventually to the courts and to correctional institutions. Too many seek solace and escape in withdrawal and in a variety of addictive habits. Many become addicted to television;

these children often watch five, six, seven and more hours of television a day, in slack-jawed stupor. Some become addicted to food and become obese. Alcoholism, even in elementary school-aged children, is a growing menace. Others get into heavy drug abuse, often mixing alcohol and other drug addiction to the extent that their lives are endangered. For some children, the progression is from mild to clinically significant depression, with severe emotional problems. Some are suicidal. A few do take their own lives.

At best, individuals afflicted with learning handicaps learn with difficulty through the years to adjust to the idea that they are not very capable, and to compensate as best they can, for the inadequacies. They live quietly dissatisfied and discontent, working at jobs they don't like, that they would never otherwise have chosen, sometimes neurotic, always feeling unfulfilled.

Let's look at this litany we have just told—social withdrawal and isolation, delinquency, crime, addiction, obesity, depression, emotional disturbance. Each of these abstract terms names a major problem of modern life. Each is the business of the mental health worker. Each directly and critically affects the economic and spiritual life of the nation.

But they are abstract terms. In human terms, the abstraction comes down to the concrete—to the specific, living, individual child and his family. For the family suffers, too.

It may be true that in some instances, adversity unites the family. It is also true that too often the effect is just the opposite. It does not matter whether the family is rich or poor, lives modestly or is highly placed, is professional or non-professional. It is the same for all. The illness of one member affects the whole family. The more serious the illness, the more effort and expense required to deal with it, the more extensive and pervasive the effect on the family. Illness and incapacity are conditions that can and do make incredible demands on the physical and emotional stamina of the family. Many families split wide open under the strain.

The handicap of learning disability is an invisible one. A child may be handsome, sound of limb, with hearing and sight intact, even clever—he looks and acts like every other child, and therefore we expect that he will get good grades in school. We expect that he will do well. There is no reason he should not. If he does not do well, we may say that he is lazy, that he is a dreamer, that he is not interested, not motivated, or that he doesn't care. And we usually do tell him—and his parents—all those things.

Parents who feel in their hearts that there really is something wrong, or at least that there is something which is operating that they do not clearly understand, fight a lonely and anguishing battle, especially if they begin in the child's earliest years to seek help for him. They speak to an army of specialists in education and in medicine, in psychology and psychiatry, to grandparents, neighbors and friends. Few are really informed enough about learning disabilities to have the competence to identify such children. Their responses compound the problem. Parents are told that they are overly anxious, overly-protective, over-indulgent, or pressuring the child with unrealistic expectations of performance for a child who is—they say—a slow learner, or borderline in intelligence, or even retarded. Parents may be told that they are unable emotionally to accept the reality of a less than highly achieving child, unable to see that he is simply spoiled and out of control, unable to admit that he is really emotionally handicapped (the latest term for emotional disturbance). Some parents are told that the root of the child's problem is in their own emotional disturbance. A few have been told that the child will do well if they can improve their sex life. Believe me, it takes a strong ego and a firm hold on one's own sanity and self-confidence to survive that advice over a period of years. The pilgrimage for professional help is far more destructive when the pilgrim travels alone—for often it is only one parent who senses that there is a real difficulty, and the other parent perhaps with the best intentions, too often is in the ranks of the sceptics and the abusive. This is a stress that is virtually unbearable to husband and wife, and therefore unbearable for all the children of the family. Parents of the child with learning disabilities have a fairly high rate of separation and divorce. The stability of the family and the security of the children is very much at stake.

It is well-known that the siblings of the handicapped child often have great difficulty accepting the disproportionate time and money spent on the child who by now has come to represent the family's *problem*. (Handicapped children, by the way, are used in too many families as scapegoats; the handicapped child becomes the dumping ground indeed for the entire family's frustrations and hostilities.) It is less well known that siblings are often deeply troubled by the questions: What is really wrong with Joe? Is it catching? Can that happen to me too? Will I be dumb then too? Even more corrosive is the guilt which the sibling bears because he learns well and easily though his brother does not. Often he is ashamed of the sibling. Then he is ashamed because he feels ashamed. He too may be depressed over the

situation, fearful if his parents are in disagreement about the causes, anxious if there is open conflict, even hostile and antagonistic to the cause of the problem—his brother (or sister, though there are fewer girls affected than boys).

With all this going on, we have a family whose mental health is in jeopardy, even in serious jeopardy. Not only the child who is handicapped, but now several members of the family feel conflicted, frustrated, beset by doubt and self-blame, by guilt and despair, feelings of inadequacy and an inability to cope well. They may become bitter or enraged.

Clearly, families beset by such problems, whose emotions, time and finances are being drained in the agonizing efforts to help one child, are not free to contribute to the social life of the community, and may in fact be precluded from social life completely. Their purchasing power is diminished. Their medical problems may increase.

Clearly the consequences to the quality of life in the community, even leaving aside the possibility of crime, addiction or mental illness, are very serious indeed.

What is to be done about it? What do we know about learning handicaps that we can use to develop sensible, efficient, effective and affordable solutions to the predicament of the child who does not learn? We know enough.

We know that most often, these difficulties are manifested in basic skills areas, especially in language skills, in reading, writing, spelling, composition, and arithmetic. We know that most often the problems are with language, not with ability. The children can and do learn basic subjects with great success when they are taught by methods different from the conventional instructional techniques used in most classrooms. That is, they learn when they have teachers who know how to teach them. Many of the children are of superior and even very superior intelligence. Some are gifted in intelligence. Many are gifted in other ways—in abstract mathematical thinking, in music, in art and architecture, some even gifted in the use of the spoken word—in verbal expression. They begin, like all other children, eager to learn and confident of success. When they begin under the direction of properly trained teachers, they do succeed. Such teachers are to be found in regular schools, as well as in special schools or special classes, but they are too few to meet the needs. In fact, since there are no doubt at least one or two children with learning disabilities *in every classroom*, only if every classroom teacher is equipped to teach them by alternate methods can their needs be served appropriately.

We know that the best time to start is when the child begins school—in nursery school and kindergarten. Even a child who is not identified until he is in first grade has an excellent chance of succeeding and of avoiding the failure syndrome. Early identification and early intervention is critical if the child is to avoid failure, shame and the conviction of self-blame and worthlessness. Identified even in second grade, with the marvelous resiliency of youth, such youngsters can bounce back from an initially unsuccessful school career and go forward to a normal school development.

We know that if a child has lived at school for five hours a day, five days a week, ten months a year for three or more years, the story is a whole lot different. Such a child knows despair. He has already developed a view of himself, a self-concept, that is very poor. Just as do physically abused children (and the learning-disabled child, by the way, is the victim of societal and institutional abuse) the LD child blames himself for his failure to learn, accuses himself of being bad and lazy, and (even when he does not know how to try any harder) accuses himself of "not trying hard enough."

We know that the longer help is delayed, the worse the consequences. The child—even the otherwise gifted child—begins to fail in everything, not just in school subjects. He loses his confidence, his nerve, his friends, often he loses the friendship of at least one of his parents. He is demoralized. He is certainly affected emotionally and socially. To help older children back from failure to success is much more difficult and tedious for everyone, including the child, takes much longer, is far more expensive, is subject to many more temporary regressions, usually requires counseling for both parents and child, and sometimes simply does not "take" as well as if the help had come earlier.

We know that we are talking about a minimum of two children in every classroom. There is a widespread consensus that the number of children affected represents from 10 to 13 percent of the total student population. More conservative estimates range from 2 to 7 percent. If we take the 7 percent figure, in one school district, Montgomery County, Maryland, for example, then we are talking about some 7,500 youngsters. To retain one child for one year in this school district, at the current rate, costs over $2000. The cost of placing a student in a special education class is significantly more—perhaps twice as much more. Special schools in this District of Columbia area for the learning disabled child range in cost from more than $3,000 to $5,000. Special residential schools, often necessary where the emotional consequences have been severe, range from $8,000 to $13,000, and can cost as much as $33,000 a year.

We know then that the costs of delayed treatment for such children are extremely heavy to the tax-paying public and to the parents. For families, the costs of a round of diagnosticians and a succession of tutors and private school placements can be ruinous. Most families cannot begin to meet it.

This enormously expensive, haphazard, agonizing and piece-meal approach to the solution of a child's learning problems must be replaced. What is required is a reliable, coordinated, effective and economically feasible method of systematic early identification and intervention. If the identification is delayed, rehabilitation is required. This must be closely monitored, accountable to the community and most important, available to children of every economic background and not merely to the well-to-do or the frankly rich. This brings us immediately to the capabilities of the regular classroom teacher and of the public schools, and the solutions there will not be wrought soon, certainly not without vigorous and relentless political pressure from parents. In the meantime, we must do everything possible to see that the children are well served with the best resources at hand.

To prevent failure and frustration, to ensure success in school for children is to be a part of the preventive mental health movement, an area which President Carter has designated as one among his highest priorities in our country.

Selecting Initial Reading Instruction for High-Risk Children: A Theoretical Approach

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Introduction

Initial instruction in reading is one of the most important aspects of a child's school career. Young children sense success or failure early and this has a profound effect on their attitude toward academic learning and their feelings about themselves. This paper proposes a theoretical approach for maximizing the possibility of initial success in reading by matching beginning reading instruction to characteristics of first grade students.[1]

Schools frequently use tests that purport to predict early reading failures, and "screening" for possible failures has become routine in many kindergarten programs. Research is now needed to develop procedures to prevent reading failure rather than merely predict it. Abilities that are directly related to the reading process and to learning to read should be identified, and there should be an ongoing assessment of the child's progress along with instructional adaptations to match the child's skills and abilities. Current research, comparing the performance of reading-disabled children on various tasks with that of a control group, identifies correlates of reading

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[1]Bateman (1968), Harris (1965) and Robinson (1972) each investigated the effects of differentiating children on the basis of auditory and visual strengths or auditory and kinesthetic skills assigning them to either a phonics or sight approach. They sought significant interaction between modality strengths and teaching methods but, for a variety of reasons, did not find them. The approach outlined in this paper is concerned with characteristics other than overall modality preferences and it does not dichotomize reading programs as visual or auditory.

failures, but it does not help in overcoming or circumventing the deficits. A psychological analysis of the reading process will result in hypotheses about abilities that are necessary for the initial reading task. Evaluation of the hypothesized abilities should then lead to suggestions for instruction that would take advantage of the areas of competence exhibited while working on areas of incompetence.

Fortunately, there are several different approaches to beginning reading instruction, each one utilizing different skills and strategies. Our understanding of what processes are involved in the beginning reading task under these various forms of instruction and our understanding of what processes are necessary for successful reading should suggest tentative instructional strategies for beginning reading that will circumvent failure.

To develop a scheme for making instructional decisions, let us (1) consider the current theories and models of the reading process in order to gain a proper perspective on the task of reading; (2) analyze several distinctly different published reading programs to determine which skills are most important to each; (3) review syndromes found among dyslexic children to alert us to common deficit areas and determine which of these are measured in young children with readiness tests or screening batteries; and (4) suggest which skill areas it might be most productive to measure. Finally, the implications for instruction stemming from such a theoretical approach will be discussed. The discussion is confined to the very earliest instruction in reading and the instructional implications may span only a few weeks for some children, several months for others and as long as a year for still others.

Theoretical Models of the Reading Process

Research on theoretical models of reading was prompted by Holmes' (1953) *Substrata Factor Theory of Reading*. Such research continues today and new theories of reading continue to be generated. Most of the literature relating to models is presented and/or reviewed in Singer and Ruddell (1976). These models are used in designing reading research and in designing instructional materials and methods. The models range greatly in complexity; some use very few hypothetical constructs and others posit a great many. A few are summarized below and the components which are most consistently stated or implied are given.

Singer (1969) diagrammed a model inferred from Carroll's (1964) definition of reading, which is perhaps the simplest model. It depicts the "stimulus input" or print, an "oral reconstruction" of that input, and "meaning responses" which are identical to those an individual would give to the same spoken message.

Goodman (1970) expands on the model inferred from Carroll and identifies three kinds of information used in reading: graphophonic information, syntactic information, and semantic information. These, claims Goodman, "are available to the reader at the same time in graphic language" (p. 16). In his model, provisions are also made for meaning to be gained directly from print; i.e., the recoding into phonology may be bypassed. He also incorporates in his model a series of abilities that make it possible for the reader to process the three kinds of information, including the ability to search memory for phonological cues and related syntactic and semantic information associated with the perceptual images formed from visual cues.

Ruddell (1969) structures his model to take into consideration several levels of language: a surface structure level that "encompasses morphemic and syntactic structures which are realized in the form of the graphemic, morphographemic, phonemic, and morphophonemic systems"; a level of structural (relational) and semantic (lexical) meanings that includes transformational and rewrite rules and a mental dictionary; and the level of deep structure where language is interpreted and stored in memory.

Gough (1972) offers a model for the skilled adult reader, but his theoretical sequence of events suggests the nature of the process for a beginning reader as well. He theorizes that after a reader fixates on a section of print, an iconic representation of the visual stimulus is formed; letters are recognized from the icon and these are transposed into abstract phonemic representations that are used to search the mental lexicon and the reader then understands the words in the sentence; these words (with phonological, semantic, and syntactic information for each) are deposited in primary memory until a sentence is understood from whence it is deposited in "The Place Where Sentences Go When They are Understood (PWSGWTAU)" (p. 340).

LaBerge and Samuels (1976) focus on the necessity for automatic processing in their model which then implies automaticity for the subskills of reading and for their interrelations. In their schema, visual perception of letters, spelling patterns, and/or words occurs; there is a phonological recoding of words aided by phonological memory, visual memory, response

memory, semantic memory, episodic memory, and the associations between visual and phonological codes; then meanings of the phonological word codes come directly from an associative connection with a semantic meaning which has been learned through experience in spoken communications. For these authors, there are four major stages of processing—visual memory, phonological memory, episodic memory and semantic memory—and there are optional processing routes which may use two, three or all of these stages in several different orders.

These few representative theoretical models have been described here in an overly simplified manner primarily to highlight the commonly hypothesized components of the reading process. The following processes and components (indicated by an asterisk) are frequently mentioned in the models of reading or are implied as necessary (but not necessarily sufficient) for successful reading:

Visual perceptual processes
- *visual memory for letters, letter clusters, words, phrases and sentences

Visual-to-phonological recoding processes
- *phonological memory for letter sounds, clusters, words, phrases and sentences

Phonological to semantic decoding processes
- *semantic memory or lexicon

Processes of comprehension of larger units
- *syntactic knowledge
- *semantic knowledge

Visual to semantic decoding

Semantic and syntactic to phonological recoding and/or visual perception
- *semantic and syntactic competence
- *knowledge of orthographic rules
- *knowledge of phonological rules

If research can establish that these theoretical components are necessary subskills for readers, the lack of ability in one or several of them might indicate some causes for reading failure which can be taken into account in instruction.

Beginning Reading Tasks

"Reading" in the very beginning stages of formal instruction is a different behavior for each of several general approaches. In this section, the subskills theoretically important to the beginning reading task and the sequence in which they are taught under several of the more common approaches are delineated.

A task analysis of the early behaviors in each approach will reveal its component skills. Mastery in these component skills and their integration with each other are assumed necessary for successful reading. Several common approaches[2] and an early expected competent reading behavior for each follows.

(1) *A phonic approach* (e.g., McCracken and Walcott 1966). Successful performance is the recoding of "phonically regular" words, the elements of which have been taught, in the context of a story. The stories are simple and the reader is expected to understand them since the content is assumed to be familiar.

(2) *A linguistic approach* (e.g., Robinett et al. 1970). Successful performance is the recoding of words, with particular spelling/sound patterns, in the context of a simple story. Again, simple content is assumed and comprehension expected.

(3) *A sight word approach* (e.g., Robinson et al. 1956, 1962). Successful performance is the recoding (from sight to sound) and understanding of previously taught words in context (usually accompanied by a picture) which relate to an incident or otherwise constitute a short story.

(4) *The language experience approach* (Allen 1976). Successful performance is the ability to reread and understand several sentences created and illustrated by other class members and oneself. This approach emphasizes listening, speaking, and writing as well as reading.

It is important to reiterate here that these program descriptions and the following task analyses are concerned only with the very initial stages of reading and with the more obvious differences in the programs. Most programs are directed toward having the children eventually learn to read (comprehend) stories of different types, even in the first few grades, and the

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[2]Some of these references are to programs published in the 1960's because the newer ones tend to be more eclectic in their approach. As such the newer ones do not lend themselves to task analysis because the sequence of instruction is not stable.

same program may be used quite differently in different classrooms. The implementation of any given program varies considerably from teacher to teacher. Therefore, our concern is an analysis of those tasks central to the beginning of these types of published reading programs.

If we are quite explicit about what these different tasks are, and if we can devise valid tests for them, then we can match instruction with a child's own pattern of skills or abilities at that point in time. It is expected that there would be continued re-evaluation and flexibility in assigning instruction throughout the child's program. Our focus now is on how to *begin* reading instruction with a given child in order to maximize success and minimize failure.

The instructional sequences in each of the four approaches named above are outlined below and for each step in the sequence, prerequisite skills are stated.

Instructional Components and Subskills for Phonic Instruction:

1. Learning letter sounds for printed letters
   - visual discrimination for isolated letters
   - auditory discrimination for letter sounds
   - memory for visual letters
   - memory for letter sounds
   - memory for associating letters and sounds
2. Learning to blend letter sounds into words
   - discrimination of similar words
   - memory for sequence of sounds
   - word meanings of frequent and infrequent words
   - ability to blend sounds into words
3. Learning to read in simple sentences
   - memory for learned ("phonic") words
   - memory for word sequences
   - sentence meaning
     - oral competence: vocabulary and syntax
     - automaticity in recoding
4. Learning to read simple stories
   - listening comprehension for stories
     - sequence of events
     - ability to carry meaning in longer context

Instructional Components and Subskills for Linguistic Approach:

1. Learning to read patterned words
   - visual discrimination for patterned words (bat, pat . . .)
   - visual discrimination for letter clusters
   - auditory discrimination for patterned words
   - auditory discrimination for phonemic clusters (/*im*/, /*at*/, /*in*/. . .)
   - memory for spoken words
   - memory for written words
   - memory for letter clusters (at, an, in, an . . .)
   - memory for sound clusters (/*at*/, /*an*/, /*in*/ . . .)
   - word meanings for frequent and infrequent words
2. Learning to read simple sentences
   - memory for learned ("patterned") words
   - memory for word sequences
   - sentence meaning
     - oral competence: vocabulary and syntax
   - automaticity in recoding
3. Learning to read simple stories
   - listening comprehension for stories
     - sequence of events
     - ability to carry meaning in longer context

Instructional Components and Subskills for Sight Word Approach:

1. Learning to read printed words
   - visual discrimination for dissimilar words
   - memory for printed words
   - memory for spoken words
   - auditory discrimination for dissimilar words
   - word meanings for common (i.e., frequent) words
2. Learning to read simple sentences
   - memory for learned ("sight") words
   - memory for word sequences
   - sentence meaning
     - oral competence: vocabulary and syntax
   - automaticity in recoding
   - using semantic and syntactic cues to recode new words
3. Learning to read simple stories
   - listening comprehension for stories

sequence of events
ability to carry meaning in longer context

4. Learning phonic analysis
   ability to abstract and generalize

Instructional Components and Subskills for Language Experience Approach:

1. Learning to read familiar sentences
   ability to create a sentence orally
   word meanings of words commonly used
   sentence meanings of common speech
   oral competence: vocabulary and syntax
   memory for oral sentences
   memory for printed sentences
2. Learning to read frequently used words
   memory for printed words
   memory for spoken words
3. Learning to copy simple sentences
   ability to write
4. Learning to read simple stories
   ability to use picture and contextual cues
   listening comprehension for stories
   sequence of events
   ability to carry meaning in longer context

Differences in Program Approaches Relevant to Development of Reading Processes

The different components in all of the reading methods analyzed are assumed to be important for initial readers in order to develop word recognition strategies, fluency, and comprehension strategies. They represent a set of skills that all children should eventually master, but the sequence in which they are mastered, and the manner in which they are mastered vary. For instance, the language experience approach begins with decoding sentences and the phonics approach begins with recoding letters to sounds. The sight approach uses stories of familiar events to teach the child to master new words, while the linguistic approach teaches words by letter patterns. Before we comment on the importance of these variations for

beginning readers, a word needs to be said about factors not included in the analyses but important to the learner's attention and motivation.

The relative importance of attention and motivation in the different programs is not revealed by our task analysis, but they are important and should be considered in selecting an approach. The motivational qualities of the materials and the way in which a teacher works with her students will vary greatly, depending perhaps more on classroom/instructor differences than on program differences. Because these factors are not included in the present analysis, it should not be construed that they are unimportant; they are very important, particularly in the initial stages of instruction.

Other variations that occur as much within programs as between programs and that should be taken into consideration are such things as: the amount of teacher talk; the extent to which mastery is required before moving to the next step; the explicitness of the teaching (i.e., how much is left for the child to conceptualize); the size of the instructional steps; other supporting activities; quantity of oral reading and in what manner; etc. One can also enumerate variables that make instruction more or less effective with certain kinds of children, and these should be considered in selecting a program. However, for the present purpose, only those program components that are explicit to each particular approach will be discussed.

Table 1 presents the components of the reading process as revealed by the review of theoretical models. The teaching sequence for the first two or three clusters of instructional components (outlined above) is indicated with the numerals 1, 2 and 3 under each approach. The task analysis of specific programs revealed that some abilities are necessary to certain instructional techniques and are not included as components in the reading models. Specifically, blending sounds and writing are two instructional components which are not found in the models but are presented at the bottom of Table 1.

Other concepts not included which may vary in importance from one instructional method to another are: print is read from left-to-right and top-to-bottom; the concept of a "word," spoken and printed; shorter (or longer) spoken words correspond to shorter (or longer) printed words; and the concept that small differences in a spoken word correspond to differences in the printed word as well. While such concepts are not included in Table 1, they are mentioned here to call attention to the fact that it may be necessary to include them as a part of the instructional sequence outlined above for the high-risk children.

Table 1. Components of the Reading Process and Beginning Reading Tasks

PROCESSES and COMPONENTS of Reading	Components of Beginning Reading Tasks for:			
	Phonic Approach	Linguistic Approach	Sight Word Approach	Language-Experience Approach
Visual perception				
visual memory for letters	1			
letter discrimination	1			
visual memory for letter clusters		1		
letter cluster discrimination		1		
visual memory for words		1	1	2
word discrimination	2	1 (patterned words)	1 (dissimilar words)	
visual memory for phrases				
visual memory for sentences				1
Visual to phonological recoding	1 (sounds)	1 (patterned words)	1 (frequent words)	2 (words) 1 (sentences)
visual perception (see above)				
memory for letter names				
auditory discrimination: letter names				
memory for letter sounds	1			
auditory discrimination: letter sounds	1			
memory for sequences of sounds	2			
memory for phoneme clusters		1		
auditory discrimination: phoneme clusters		1		
memory for words	3	2 (patterned words)	1	2
auditory discrimination: words		1 (patterned words)	1 (dissimilar words)	

memory for lists of words	3	2 (patterned words)	2	
memory for phrases	3	2		
memory for sentences				1
automaticity in recoding	3	2	2	
Phonological to semantic decoding	2	2	1	1
visual to phonological recoding (see above)	1	1	1	1
vocabulary: comprehension	2	1	1 (frequent words)	1
Comprehension syntax: comprehension	3	2	2	
combined semantic and syntactic: comprehension	3	2	2	1
Visual to semantic decoding				
visual perception (see above)				
vocabulary: comprehension (see above)				
comprehension (see above)				
Semantic and syntactic to phonological recoding and/or visual perception			2	1
vocabulary: production				1
semantic and syntactic: production			2	1
orthographic rules				
phonological rules				
ABILITIES peculiar to one or another approach (rather than process)				
blending sounds into words	2			
writing, copying				2

Numerals above indicate teaching sequence for first two or three clusters of components for each approach.

As can be seen in Table 1, skills necessary for the first stages of the phonic approach, but not as important to the first stages of the other approaches, include discrimination and memory for letters, letter sounds, and sequences of letters (words) and sounds, and the ability to blend sounds into words. A visual memory for words, while useful, is not mandatory at the very beginning of the phonic approach to the same degree as it is in the other approaches.

In the linguistic approach, visual discrimination skill for very similar words (*pan, fan, tan,* etc.) is very important as is visual memory, auditory discrimination and auditory memory for such words. While many of the same skills are required for a phonic approach and a linguistic approach, there are major differences also. In the linguistic approach an ability to blend isolated letter/sounds into words is not required as it is in the phonic approach.

The skills that seem to distinguish an approach whose primary focus is the learning of sight words are: the ability to remember many words visually and their spoken counterparts, and the ability to use semantic and syntactic knowledge to recode unknown words. Auditory and visual discrimination skills are less critical for a sight approach because words for these programs are chosen for their high utility and/or high frequency and such words are usually not similar to each other in sound or print. Also, the words taught in the sight approach are strongly cued by context and thus the need for visual discrimination skills is reduced.

Skills unique to the initial stages of the language experience approach are expressive language, a memory for oral sentences, and writing skills. Discrimination and memory skills (visual and auditory) for units smaller than words are not demanded initially.

An inspection of Table 1 reveals how central certain skills are for all initial reading instruction. Vocabulary and syntactic knowledge (not performance) are essential to all approaches. Memory skills (auditory and visual) are also important for all approaches; however, the unit of instruction and therefore the *unit* for which these skills are important is the critical difference between one approach and another. Auditory and visual discrimination skills vary in importance according to both the unit of instruction and the type of words to be learned. Certain other skills are of primary importance to only one or two of the approaches.

We can speculate as to which skills seem to apply differentially to the several approaches analyzed, and several such speculations are stated below.

(1) If a child is weak in the area of expressive language, with adequate auditory and visual discrimination and memory skills for words, a phonic or linguistic approach might be more successful initially. Growth in reading skills focused on recoding, although it may be slow, should afford a positive experience. Activities in the classroom directed toward developing the weaker language skills may be of a more remedial nature while the suggested instruction in reading is designed to be a positive experience.

(2) A second hypothesis is that if a child is weak in auditory and visual discrimination skills but has adequate language skills, particularly expressive language skills, the language experience or a sight approach may be more successful initially. If the extremes of these dimensions are found, that is, if expressive language skills are particularly strong and discrimination and memory skills for small units very poor, the language experience approach might be more successful.[3]

(3) Another speculation is that if a child responds to wholes (i.e., words and sentences) more successfully than parts (i.e., letters, letter sounds, clusters) as revealed in memory and discrimination tasks, then the programs most likely to be successful will be the language experience and sight approaches. Similarly, if discrimination and memory skills for letters, sounds, etc. are stronger than those for words and sentences, the phonic or linguistic approaches might be better.

These hypotheses suggest that combinations of skills are necessary for the beginning stages of reading[4] and we need also to be concerned about children who do not have an adequate set of skills to begin any of the approaches discussed. When we look at the research, are there patterns of skills or deficits we can anticipate? Research defining various syndromes of dyslexia and evidence from the neurosciences about functions of the brain suggest that certain patterns of strengths and weaknesses can be expected.

Syndromes of Dyslexia

To date, there has been no systematic attempt to determine if subgroups exist among young children predicted to be at high risk for reading

[3] Again, activities to develop the necessary auditory and visual skills are needed at the same time to strengthen the weak areas.

[4] There is certainly a need for research to determine *how critical* a given ability is for a given approach and *how much* of that ability (in some objective measure) is enough to assure success.

failure; that is, we have not defined groups of at-risk children who have similar patterns of strengths and weaknesses.[5] If such subgroups do exist, insruction might be suggested for groups of children that would utilize their competencies while remedial efforts were made to strengthen their weaker areas. Support for the notion that subgroups may indeed exist comes from the research on older children with severe reading problems.

Historically, the earliest research on dyslexia (Morgan 1896 and Hinshelwood 1900, cited in Ingram 1971) emphasized a visual perceptual deficit, and many early researchers implied a unitary syndrome of weakness in visual perception. The concept of a homogeneous syndrome of dyslexia was common, and variability among patients was discussed but not considered as a rationale for looking for different syndromes. Orton (1937) characterized the dyslexic child as being "word blind," but he also found four other categories of problems: developmental aphasia, developmental word deafness, developmental motor aphasia and developmental apraxia. More recently, auditory problems have been the focus of attention (Zurif and Carson 1970; Satz, Rardin, and Ross 1971; Bryden 1972), as have intersensory problems (Birch and Belmont 1964, 1965; Senf 1969; Zurif and Carson 1970), temporal sequencing (Johnson and Myklebust 1967; Doehring 1968), and linguistic or verbal processing problems (Rabinovitch 1968; Denckla and Rudel 1976; Vogel 1974; Vellutino, Steger, and Pruzek 1973).

The suggestion from Shankweiler (1963) that dyslexia "should not be regarded as a unitary condition" (p. 61) has recently been heeded by researchers who have sought to identify a variety of syndromes. Attempts have been made to organize symptoms into clusters that would then behaviorally describe subgroups of dyslexics. Much of this recent work, and earlier work as well, has reflected various etiological theories, and posits different neurological organizations,[6] but there has been growing agreement that there are at least several syndromes to be found in children who have either not learned to read or have had great difficulty in learning to read.

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[5] de Hirsch, Jansky, and Langford in their earlier work (1966) did discuss groups in terms of relative strength and weakness in the auditory and visual modalities (p. 80). Later Jansky and de Hirsch (1972), however, emphasize the fact that certain skills, such as memory, go across auditory and visual skills and they no longer suggest primary attention to modality groupings for instruction.

[6] Work in neuropsychology and neurology directed toward identifying neurological mechanisms associated with the reading process are seen as very important. From such work we can expect to gain insights into the way in which the development of beginning reading skills may intersect with the development of the brain for children in the 5–7 age group.

The study by Mattis, French, and Rapin (1975) provides support for three subgroups: (1) a language disorder syndrome (about 28 percent of the 29 developmental dyslexic children tested) consisting of anomic and either a comprehension, imitative speech, or speech sound discrimination disorder with normal visuo-perceptual, graphomotor, and speech blending abilities; (2) an articulatory and graphomotor dyscoordination syndrome (48 percent) consisting of speech articulation deficiencies (often poor tongue coordination) and a graphomotor dyscoordination evidenced by certain performance characteristics in copying four of the cards from the Benton Test of Visual Retention with language and speech discrimination intact; (3) a visuo-spatial perceptual disorder syndrome (14 percent) consisting of lower (by 10 points) performance IQ than verbal IQ scores on the WISC, and even lower Raven's Progressive Matrices Test scores, and low copying scores on the Benton. The authors found that the two major syndromes (the language disorder syndrome and the articulation and graphomotor dyscoordination syndrome) were defined by the absolute level of performance on certain tasks. The visuo-spatial perceptual disorder syndrome was "defined primarily by the adequacy of several processes in relation to each other" (p. 158). They suggest that visual-perceptual defects are more frequently found in younger children. The possibility exists that such children may be "manifesting maturational lags in several aspects of perceptual development, rather than a fixed deficit, and by latency age may experience a 'catch-up' phase" (p. 158).[7]

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[7] We might extend this possibility of maturational lag to the development of other processes or abilities which need to be integrated for beginning reading instruction. Some, for instance, have not yet developed the ability to guide their own behavior, to attend to the task at hand (White 1970). For these, different grouping procedures (i.e., individual attention) may be necessary.

In normal brain maturation, "Brain connections from back to front areas of cortex are next to last on the within-hemisphere maturation waiting list . . . These connections, particularly in the left hemisphere, are the 'hear it—speak it' and 'see it—copy it' circuits. Last to mature are the very far front brain connections. By analogy of what we know of the adult, these last maturing connections, linking what we know to what we want through some inhibitory/delay system, probably subserve the capacities for self control, selective attention, and work so necessary for education" (Denckla 1978, p. 251).

The relative efficiency of the right or left hemisphere of the brain is another area of neuropsychological study of pertinence to reading instruction. Dichotomy of function greatly oversimplifies the complexity of the brain. Nevertheless research on differences in function may provide us with some hints on the relative efficiency of the right or left hemisphere of the brain and thus encourage successful reading strategies related to the more efficient (more developed) hemisphere while presenting simpler tasks that demand the type of organization and processing in which the other hemisphere specializes. "The left cortical hemisphere in about 98 percent of

In an earlier study, Kinsbourne and Warrington (1963) found support for the concept of several syndromes within dyslexia. Two groups of poor readers, ages 8–14, were designated on the basis of their WISC or WAIS scores: Group I's performance scores were 20 points or more above their verbal scores and the converse was found for Group II. Other measures then indicated that Group I children were poor in language, naming, and spelling tasks, but successful in copying and writing. Group II were poor in writing, copying, mechanical aspects of arithmetic, and the ability to discriminate fingers when touched (finger differentiation), but had no language difficulties. These group designations and follow-up descriptors, although more global than the groups described by Mattis, French and Rapin, also suggest that severe problems in reading may be associated differentially with various sub-processes thought to be relevant to reading.

Other studies and articles as well posit several syndromes for students with severe reading problems which provide an impetus for identification procedures that would suggest assigning different instructional strategies. Among these are a study by Cole and Kraft (1964) who designated five groups; Ingram et al. (1970) who delineated two groups; Boder (1973) with three categories of error patterns of reading and spelling errors; and Satz, Rardin, and Ross (1971) with two categories. Denckla (1972) described three clusters of symptoms in learning-disabled children and more recently (1978) she discussed a number of dyslexic and other syndromes, all categorized under the term "minimal brain dysfunction." She also offers guidelines for the education of children with the problems discussed.

Most of the studies mentioned above have involved children over eight years of age who were severely retarded in reading, but the studies do suggest that similar clusters of competencies and weaknesses might exist for younger children as well.

In sum, the literature on reading disability syndromes tends to find certain factors often associated with the following processes or functions:

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the right-handers and in about two-thirds of the left-handers specializes somewhat in a propositional, analytic-sequential, time oriented serial organization well adapted to learning and remembering verbal information . . . the right hemisphere specializes somewhat in oppositional, synthetic-gestalt organization well adapted to processing information in which parts acquire meaning through their relations with the other parts" (Wittrock 1978, p. 65). Strength in imagery and holistic parallel processes (right hemisphere) suggest different reading instruction from that suggested by strength in verbal, analytic serial processing. Further, some thought is now being given to the notion that stimulation early in life for functions of either hemisphere might aid development.

Language functioning
- naming
- syntax
- receptive language—comprehension
- vocabulary—semantics

Speech
- articulation
- imitative speech

Visuo-perceptual skills
- discrimination
- copying or construction
- visual memory
- writing

Auditory skill
- discrimination of speech sounds and words
- sound blending
- auditory memory—sentence and digit span
- auditory sequencing

Other
- finger differentiation
- laterality

These factors are entered in Table 2, juxtaposed to the theoretical processes and components of reading. Some factors from the dyslexic-syndrome research are not included as components in the theoretical models of the reading process and they are listed in Table 2 at the bottom of that column. One might hypothesize that measurement of the factors found in the dyslexic research should constitute an important aspect in the selection of an optimal approach for initial reading instruction. One would expect, then, that some of these factors would be evaluated in the screening batteries and reading readiness tests currently used. Let us look briefly at some of the research and several tests in this area.

Screening Batteries and Reading Readiness Tests: Their Relationship to the Reading Process

Screening batteries for identifying children who are at high risk for reading failure have been investigated to test their predictive qualities. One of the better known instruments is the Jansky and de Hirsch (1972)

Screening Index which includes tests of letter naming, picture naming, word matching, design copying, and sentence memory. It is administered individually and the authors provide a *Diagnostic Test Battery* as a follow up to be administered to those kindergarten children identified by the *Screening Index* as being at risk for reading failure. Forms of intervention are discussed and it is suggested that the curriculum take advantage of the child's competencies. The authors recommend that individual interventional strategies be offered, based on each child's specific functioning.

The Jansky and de Hirsch subtests reflect four factors closely associated with reading: oral language, pattern matching, pattern memory, and visual motor organization. Teacher observations of characteristics of a child's classroom behavior are also suggested.

Other screening batteries widely used are the *Meeting Street School Screening Test* (Hainsworth and Siqueland, 1969) and the *Pre-reading Screening Procedures* (Slingerland 1969). These tests evaluate motor patterning and expressive language, two areas not commonly found in readiness tests. The screening procedures for pre-schoolers survey within the following areas: social development and behavior, cognitive development, and auditory and visual acuity. The components of the more recent screening tests include many factors that are similar to the more traditional reading readiness tests. (See Table 2.)

Reading readiness tests as predictors of reading success have been evaluated in numerous studies over the years (e.g. Robinson and Hall 1942; Mattick 1963; Johnson 1969). Correlations as low as .36 (Karlin 1957) or .40 (Bremer 1959) between scores on reading readiness tests and end of grade-one reading achievement are not uncommon. In general, the correlations range from .45 to .60 (Tinker and McCullough 1968). The factors measured by several of the standardized readiness tests are indicated in Table 2 also. Studies have established the positive correlation of these factors with reading achievement, but the studies do not indicate that these factors are the cause for better achievement. For instance, Olson (1957) found that knowledge of letter names and ability to write letters tested in September correlated .55 with reading achievement in February; yet Linehan (1957) found no differences in reading achievement at the end of grade one between two groups of children, one of which had been taught the letter names and sounds before learning to read and one of which did not. Both groups used the same basal reader for instruction and did equally well.

The information gained from the predictive studies of reading readiness is of limited value for another reason as well. How students were taught to

read when relationships were found between achievement and readiness skills is seldom reported.

> Furthermore, any effort to measure reading readiness must begin and end by inquiring "Ready to read what?" and "Ready to read how?" These questions must be answered before valid tests can be selected or valid interpretations made of the results. The fact that a pupil is not ready to learn to read one type of material by one method may not indicate the same degree of unreadiness for a different type of material. Unfortunately, available reading tests do not specify the attainments essential for different types or levels of initial instruction in reading (Gray 1937, pp. 85–86).

We must, therefore, be more diagnostic than either the reading readiness tests or the screening tests in our approach to prereading evaluation. Our analyses of the reading process and our information on dyslexic syndromes suggest that factors evaluated in these tests and other variables as well are important for prescriptive purposes. Theoretically, information on such skills should help in selecting an initial reading approach.

Between the screening batteries and readiness tests, test items exist for all components which are entered in Table 2 as part of the reading process and which are also found useful in defining syndromes. Many components of the reading process that are also components of initial reading programs are tapped by currently used tests (see Tables 1 and 2).

Referring back to Table 1 the following skills are included both as components of the theoretical models of reading and as components (or skills) necessary to one or another of the beginning reading approaches. Those designated with an asterisk are not usually included in readiness or screening batteries, but perhaps should be if we are to match skills and approaches.

Language production
Language comprehension
- *Vocabulary
- *Semantic and syntactic combined

Memory: Visual
- Letters
- *Letter clusters
- *Words (specific to each program)
- *Sentences

Table 2. Components of the Reading Process and Skills Assessed by Various Tests

PROCESSES and COMPONENTS of Reading	Skills, Abilities Assessed in Research on Syndromes of Dyslexia[1]	K	C	S	M	I	Skills tested in Screening Tests[3]	M	S	J	Skills tested in Readiness Tests[4]	G	M	D
Visual perception														
visual memory for letters	recognition[2]			S			forms and letters	M						
letter discrimination	discrimination[2]			S			matching	M	S		visual matching		M	
visual memory for letter clusters														
letter cluster discrimination											finding patterns		M	
visual memory for words							perception/memory		S					
word discrimination	discrimination: words of similar shape					I	word matching		S	J	visual matching	G	M	
visual memory for phrases														
visual memory for sentences														
Visual to phonological recoding	reading words, letters, sounds		C			I	letter naming		S	J	letter sounds		M	D
											letter recognition	G	M	
											word recognition	G		
visual perception (see above)														
memory for letter names														
auditory discrimination: letter names														
memory for letter sounds														
auditory discrimination: letter sounds	discrimination of letter sounds				M	I								
memory for sequences of sounds														
memory for phoneme clusters														

auditory discrimination: phoneme clusters			
memory for words		repeat words M S	auditory memory M
auditory discrimination: words			aud. dis., sim. wds. G
memory for lists of words			
memory for phrases		repeat phrases M	
memory for sentences		repeat sentences M J	
automaticity in recoding	sentence repetition M		
Phonological to semantic decoding			
visual to phonological recoding (see above)			
vocabulary: comprehension	verbal IQ K C M		
Comprehension syntax: comprehension			
combined semantic and syntactic: comprehension	receptive language function K M		school language and listening M following directions G
Visual to semantic decoding			
visual perception (see above)			
vocabulary: comprehension (see above)			
comprehension (see above)			
Semantic and syntactic to phonological recoding and/or visual perception		(see 2 items listed below) M S J	
vocabulary: production	naming, verbal fluency, IQ K S M	picture naming J	
semantic and syntactic: production	expressive language function K	tell story, retell story M S	
orthographic rules			

Continued on page 36.

Table 2. Components of the Reading Process and Skills Assessed by Various Tests (*Continued*)

PROCESSES and COMPONENTS of Reading	Skills, Abilities Assessed in Research on Syndromes of Dyslexia[1]	Skills tested in Screening Tests[3]	Skills tested in Readiness Tests[4]
phonological rules			
ABILITIES peculiar to one or another approach (rather than process)			
blending sounds into words	blending M ability to analyze words I		auditory blending G
writing, copying	copying, writing K C S M I	copying (forms-letters) M S J	copying M
			visual motor coord. G
Other	performance IQ K C M	motor patterning M	rhyming M
	spelling K	block tapping M	quantitative lang. M
	finger differentiation K	following directions M S	beginning conson. M
	visuo-spatial skills C M	counting M	quantit. operations M
	dichotic listening S	language seq. (time units) M	phonemes: init./fin. D
	aud.-vis. integration S		learning rate (3 modes) D
	articulation M		

[1]K = Kinsbourne and Warrington (1963)
C = Cole and Kraft (1964)
S = Satz, Rardin and Ross (1971)
M = Mattis, French and Rapin (1975)
I = Ingram, Mason and Blackburn (1970)

[2]It is unclear from the report which unit of language is tested.

[3]M = Meeting Street School Screening Test
S = Slingerland Screening Test
J = Jansky de Hirsch Predictive Screening Index

[4]G = Gates MacGinitie Reading Tests: Readiness
M = Metropolitan Readiness
D = Murphy Durrell Reading Readiness Analysis

Memory: Auditory
- Letter names
- Letter sounds
- Phoneme clusters
- Sequences of sounds
- *Lists of words
- Sentences

Discrimination: Visual
- Letters
- Letter clusters
- Words
- Sentences

Discrimination: Auditory
- Letter names
- Letter sounds
- Phoneme clusters
- Sequences of sounds
- *Words (specific to each program)

Sound blending

Visual to phonological recoding
- Letter Naming (subsumes discrimination and memory for letters)

Copying/Writing

Research is needed to determine if tests of the components of the reading process and the additional variables from the dyslexic research (Table 2) will reveal different patterns of deficits in at-risk children. If so, will these patterns be useful in assigning instruction?

Possible Implications for Instruction

Direct testing of all the skills outlined at the end of the section above is proposed. If several groups of youngsters emerge with distinctive clusters of skills, instructional assignments can be recommended for each group based on the program analyses (see pp. 20 to 22, above) and then assessed. If groups do not emerge, assignments could be made on an individual basis. It is not inconceivable, for instance, that the visual-spatial, holistic, parallel processing strengths of the right hemisphere versus the verbal, analytic, serial processing strengths of the left hemisphere of the brain will emerge as patterns that might lead to a recommendation that capitalized on one or another set of strengths. The language experience approach and the sight

approach seem more compatible with strengths of the right hemisphere; although we must not overlook the need in those approaches for language skills which are thought to be more left hemisphere skills.

In addition to aiding in the selection of instruction that is most likely to succeed, the tests should also identify subskills that need improvement. For example, a group of children whose visual and auditory discrimination skills are good, but who seem unable to blend sounds into words may be offered a linguistic approach initially. Even after that decision is made there are still many choices. One high risk child in such a group may have weak oral language skills but adequate visuo-motor skills and, for her, copying words and drawing pictures to illustrate them would be helpful. Oral reading *to* this child, engaging her in conversation, story telling, helping her to memorize sentences, etc. would address her needs specifically.

Another child in the same group may have stronger language skills and weaker visuo-motor skills. It might be wise not to expect him to copy words as part of his reading instruction. Instead he might be asked to use the words in oral context and to build stories around them which could be written down by the teacher. Meanwhile concentrated work on helping him to write letters, oral directions about the ways to form the letters, and simplified copying tasks structured to improve his writing would be important. Similar examples could be drawn for differences between an attentive and inattentive child.

Individual children, even within a program approach selected to best suit their needs, will benefit from inventive and flexible instruction. It is essential that all of the factors identified as components of the reading process should be fostered in beginning reading, no matter which approach is adopted initially.

Let us consider a hypothetical case of a six-year-old with poor, but not severely impaired, language skills whose perceptual skills are adequate. For our six-year-old, demands of the reading task in the approach most likely to succeed should probably be more visual perceptual and might focus on the visual to phonological recoding in the earliest stages, instruction that would depend less on his language skills. We would expect that he could function adequately in a program with a controlled vocabulary. The task of recoding print to speech in a phonic or linguistic approach is a perceptual and associative task with little challenge linguistically. Only children with severely impaired language skills would have difficulty comprehending the simple linguistic messages to be recoded. However, if we agree that perception is a constructive act (Neisser 1976), semantic and syntactic

knowledge will be needed before long to help the reader perceive what is written. Therefore, although the language provided in the early text will probably be within the competence of the young reader and will be useful in predicting and perceiving, his limited language capability will become more detrimental as the language of the text becomes less like his spoken language, as it becomes more literary. If no special attention is given to language development, language competence will likely interfere when the written language is more difficult, less familiar. Thus, the initial teaching instruction needs to include both an approach that will foster success (perhaps phonics or linguistics in this case) and also offer remedial work in the area of weakness (in this case, language).

The intent of selecting an approach that capitalizes on strengths is not to avoid the areas of weakness. The teacher must be aware of weaknesses and provide work on them, moving the child from what he or she can do toward success on each subskill. Diagnostic procedures must reflect an awareness of the theoretical processes in reading. They must be directed toward eventually going beyond the process of learning to read, toward the development of reading itself as a desirable behavior. For these reasons the theoretical models have been discussed here to call attention to components and behaviors of the reading process beyond initial instruction. It also should be noted that the attention given to specific skills or components of the reading process must not be construed as an argument that these parts or subskills add up to total reading. The whole of reading is greater than the sum of these parts. However, these parts are seen as necessary, if not sufficient, for beginning reading to be learned.

Conclusions

What has been suggested is (1) that theoretical considerations in selecting an approach to beginning reading for individual children seen to be at-risk are important; (2) that we can be more selective in assigning initial reading programs for children; and (3) that analyses of the programs, of the children's skills, and an awareness of the reading process can help in that selection.

The prescriptive approach recommended here is one of approaching a task on which one expects the child to meet success, while, at the same time, confronting the weaker areas by breaking the difficult tasks into smaller, more elemental, prerequisite steps. The various analyses under-

taken in this paper and the ensuing recommendations form only a part of—a first step toward—tailoring instruction to meet the competencies and deficits of the children predicted to be at-risk for reading failure. A competent teacher will go beyond the suggestions made in this paper; she will attend to the details in finding ways in which each child will learn, thus fostering the child's own sense of mastery and achievement. As Gates so aptly put it in 1937:

> . . . reading difficulties result from failure to recognize and make effective instructional adaptations to individual needs—both deficiencies and special abilities (p. 395).

The challenge remains today.

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Dyslexia and Learning Disabilities: Their Relationship

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Editor for the Orton Society

Year after year, in discussion after heated discussion, we in our field are divided among ourselves and deflected from our tasks of helping children and older students by the clamor "for definitions," or "against labeling," or by other verbal hassles. One says, "You don't know what you are talking about!" and the other, "I do so, but *you* don't!"

Thanks to the clear sight of the Orton Society's early leaders, its members have been less bothered by these disputes than have some others. But this has often been at the cost of being labeled "doctrinaire" or "cultist" or "not sufficiently broad-minded." This gives rise to two dangers we have to guard against. The first is in our wondering, "Are those others right, maybe? Should I follow them, too? Can I?" or "How can I advance without toppling completely off the shoulders of my chosen and admitted giants? How shall I talk about the roots of my inspirations?" And so on. The second danger, entangled with the first, is in letting ourselves become emotionally involved in the ideological and procedural conflicts, "guarding our turf," deflected either by orthodoxy or by face-saving from our main jobs of learning and teaching.

There are at least two ways of avoiding such debilitating and distracting activities. One is in friendly, honest, seeking cooperation with our opposite, though not opposing, numbers from related fields; the other is in clarifying our thinking by adding to and putting in order the best we can get of modern knowledge. The first is already being done in increasing measure, as witness the work of the informally organized representatives of six groups in clarifying the provisions of Public Law 94-142. Further testimony to this kind of cooperation is the inter-disciplinary, inter-organizational efforts of 15 to 20 leaders from these groups and other sections of an even wider spectrum

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This paper was presented at the 28th Annual Conference of The Orton Society in Dallas, Texas, November 1977. In addition, a substantial part of the paper was prepared for the Task Panel on Learning Failure and Unused Learning Potential of the President's Commission on Mental Health (1977).

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But it is difficult, if not impossible, to push off to higher goals from a murky swamp of confusion, however rich it is in tradition and idealism. We need to establish firm ground to stand on and to step from and it is through the second way, clarifying our thinking and putting in order the best of modern knowledge, that we can accomplish this. That is what I have tried to do in this paper.

We are often asked not only "What do you mean by dyslexia?" but also "Are dyslexia and learning disabilities the same?" or "How do you distinguish between them?" The questions vary but that is what they boil down to. The easiest and simplest answer is that of the two umbrellas in Figure 1. It may be sufficient, or it may be a satisfactory temporary answer, to say that some children (the umbrella group on the left) have learning disabilities; some (the umbrella group on the right) have specific language difficulties; and there are some (under both umbrellas) who have both and often we do not know which way to send them for help.

Figure 1

*Gilbert Schiffman, Director of the National Right to Read program, has been the most active catalyst in these endeavors, but he has found eager cooperation from all the persons involved, convinced as they are of the fact that we are ready to outgrow provincialism and the "territorial imperative."

Or we might think of an iceberg as a model. It would have several peaks above the waterline which we could label with various names descriptive of the kinds of learning difficulties we observe. They would differ in configuration and prominence and might be marked to call attention to reading or math failure, speech delays or disturbances, abnormal clumsiness, confusion about time or directions, and a tendency to general disorderliness about possessions and "keeping it all together." A prominent pinnacle would refer to "spelling, atrocious!" As is the nature of icebergs, most of the connecting mass would be under water, out of sight. We could mark it "learning disability," "language learning difficulty," or by some other generalizing term. The major ideas to hold in mind are: first, that there is something in common among the clustered evidences of the troubles that are freezing out many children's capacities to learn as they should; and second, that one can expect an almost infinite variety of pattern in any field of icebergs.

Stages, Tasks and Difficulties in Human Learning

It looks as though we had better go back to a basic level and think not only about failure or difficulty in learning, but about the nature of that learning itself—the *why*, *what* and *how* of this basic aspect of life. Then, perhaps, we can do better at alleviating and preventing failure and at freeing each person more nearly to achieve his or her own learning potential.

The basic biochemical, neurophysiological and neuropsychological structures and processes through which learning takes place and is made lasting are the province of laboratory research and theoretical speculation. Their investigation is well-begun but nowhere near its end. Although the findings are always interesting and often of practical value, for our present purposes we may be justified in leaving them to their own experts. Personal observation and experience give empirical evidence that animals and humans *do* learn. Through what course of biological history and individual development do we see this learning take place? What are some of its problems in present-day reality?

As the species on the evolutionary scale leading toward humankind develop their characteristic forms and functions, the sensory systems most involved in the learning which interests us here become more important to survival and effectiveness. True, they are still based upon the ultimate

physical and chemical facts as, for example, the relationship of one quantum of light energy being necessary to stimulate one retinal rod, if I remember correctly an exciting scientific detection lecture by Selig Hecht (1940). There are maturational timetables, too, such as how early the eye can focus on an object—and perhaps how early the mind can imagine the ball hidden under the blanket. Still, the major, though not ultimate, development of sensory prowess takes place and is of paramount importance in early childhood. It does not primarily depend upon the language powers soon to come. Although humans no longer depend on taste and smell as heavily as many other animals do, the senses of vision, hearing and somesthesis are still vitally important to all animals. (Somesthesis includes touch, awareness of the muscular activity of the vocal apparatus, position in space, movement of body parts, and the like.) Much of what human and other animals do in making use of the sensory equipment is made actual in maturation, but it is very largely guided and modified by the teaching of elders as, for example, when the cat teaches her kittens to see, pounce upon, toss, kill and eat a mouse or, in play, a mouse-like object. This is prelanguage learning.

A further step in evolution—actually a quantum leap—differentiates the human from his nearest relatives. We are no longer as sure as we once were that we differ in kind; chimpanzees have shown some capacity to learn to use symbolic language, as we know it, and not merely to communicate on a pre-linguistic level (Gardner and Gardner 1969; Premack and Premack 1972). Still, it is with the human that we see clear specialization of some functions in either the right or left hemispheres of the greatly enlarged, more convoluted cortex, or "new" brain. For well over a hundred years, it has been recognized that the control of speech in most people resides in the left hemisphere. Only since 1936, however, has it been known (Benton 1965) and, in 1968, unequivocally demonstrated (Geschwind 1972) that this dominance has a correlate on anatomical differences in the two brain halves. Indeed, it was not until 1969, when Wada reported his study of infant brains (Geschwind 1972), that it became known with certainty that this difference is already present at birth.

Many of the early insights into language disabilities, however, are based on the extensive understanding of brain functioning already attained by S. T. Orton (1925). Although he did not give it much emphasis, Orton was ahead of his time in his recognition that the right hemisphere, like the left, also seemed to have its specialized and valuable functions. A few people talked about this concept in the 1940's and 1950's and Benton (1965) reviewed their work and his own in a paper that he concluded with:

> However weak its present status may be, the concept of right hemisphere dominance should not be dismissed. On the contrary, it should be subjected to even more intensive exploration than it has had in the past . . . I believe that we shall see some surprising developments (1966, p. 53).

Indeed, we are seeing some surprising developments. Currently, we are beginning to get a balanced view of not only the facts but their neurological background as well. It has long been said that one half of what makes us human is the ability to use language and to be mentally conscious, while the other half is the ability not only to use tools but to invent them, build them, and carry out the other activities of technology and the arts. Now it seems that these highly developed and differentiated capacities are based not in left hemisphere "dominance" but in hemispheric specialization —equal and opposite in many ways. This whole set of ideas, too many and too complicated to discuss here, blows a breath of fresh, clarifying air into our understanding. So much has developed in a single year that may provide fresh insight into the problem of reading and writing difficulties, that this paper is very different from the way I began to write it a year ago.

Instead of leaving the pot of technological stew on the back (right) burner, while we talk only about language development as a later stage of growth in the human race and individual, we must bring it forward along with the language *soup du jour* (on the left). It makes abundant sense to think of a *parallel* right hemisphere differentiation as having taken place at about the same time as the left hemisphere differentiation, thus leading to spoken language in the one kettle, with stone or bronze technology, cave paintings and the like bubbling in the other. For the present, however, let us leave the outcome of the right hemisphere's dish to the Chef (we shall look at it again later) and examine more closely the left hemisphere's contribution to our covered dish supper, at the same time abandoning our now overworked metaphor.

From being able to differentiate, by the age of four weeks, certain basic speech sounds, the infant develops to familiarity with the sounds of the mother tongue, the language of whatever culture he finds himself in. At first, these sounds mean little to him as true language. He begins to vocalize, to babble at random, and then, more and more, to make the sounds he hears around him. Then comes the time when, almost suddenly, as Vygotsky puts it, ". . . thought [which has been going on] becomes verbal and speech [becomes] rational" (Vygotsky 1962, p. 44). The child has

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become a language user in the true sense. In the normal course, he has made almost the whole evolutionary leap by the time he is about five years old. He can code thought into the words, grammar, syntax and intonations of his culture; he can understand five or six thousand words in several standard kinds of arrangements; and he can express his own meanings, somewhat less extensively and perfectly than his receptive comprehension, but still with a very high degree of skill. No child is born *knowing* how to do this but is born, so to speak, "*wired up*" *to learn* it with relative ease from his culture. The complex of language skills has been around for enough eons to have worked its way into the genes as a readiness to learn and needs only—but needs *surely*—the triggers of cultural influences, the natural "mother's-knee" type of teaching, for learning the skills of basic spoken language, the first-order code. Every culture, throughout the world, has its well-developed spoken language, and most of its children master it reasonably well and at about the same ages.

Let us not forget, however, that there is a parallel development going on in the non-verbal, exploratory, acting and making aspects of life, and that some of it makes its way into talk while much of it does not. This, too, has become part of the human genetic and cultural heritage.

The next stage of life, in whatever society, sees a growth in understanding and in the use of both spoken language and the nonverbal skills as the child takes on the ways of his people and grows into an adolescent and an adult. Whatever their ideological and artistic sophistication, however, many cultures that comprise intelligent and effective peoples have come this far without taking the next cultural steps into literacy and complex technology. That the *capacity* to take these steps is there is suggested both by the experience of Margaret Mead's friends in New Guinea (Mead 1955) who adapted to being catapulted, in only 25 years, from the Stone Age into the Twentieth Century, and by the Chinese peasants who became airplane mechanics in the 1940's (Kirk 1972) and now have learned to read. Such transitions are not always successful or smooth, but it does seem to be a matter of cultural experience rather than of capacity.

Both literacy and modern technology take deliberate teaching and conscious, effortful learning. For both, it is a tremendous step, not beyond our capacity as we know, but not yet merely the result of our genetic make-up. In the history of humankind, systematic written communication beyond the picture-story stage developed only yesterday, as it were, while that most useful of social inventions, the alphabetic-phonetic scheme of writing came into being just before dinner—some 5000 or so years ago. The

printing press came on with the after-dinner coffee, only a few hundred years ago, and the computer has just rung the doorbell. Think of what that does to the six-year old entering school! He can make it if we teach him well, and he *has* to make it if he is to survive in the modern world as an independent, healthy, happy person. What is this giant step into the second order symbolization that experience tells us a child can take when supported by favorable circumstances?

As linguists like to put it, the use of words, i.e., arbitrary, spoken sound sequences to stand for ideas, is a process of devising and using a *code*. All human beings use this *kind* of code. If they have command of the *same* code, i.e., know the same language, they can communicate ideas from one mind to another. While this is not perfect communication, bound as it is by a single track in a time sequence and, in oral language, within audible distance, it is nevertheless a beautifully powerful and efficient tool, one that has made possible the transmission of culture, along with the "here's how" of physical artifacts.

What is needed beyond this are ways of overcoming the limitations of timing, of time itself, and of space, and that is accomplished by visual routes. Ideographic languages use a parallel code of idea-signs (see Figure 2) which bridge the gaps of space, time (the impermanency of airwaves),

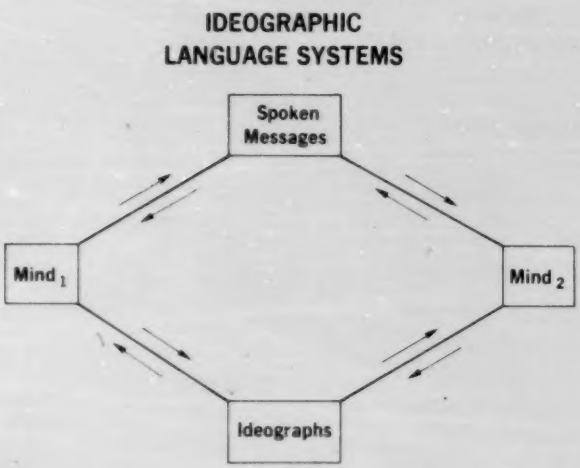

Figure 2. Transmission of thought in ideographic language systems.

and differences in speech codes. Persons who cannot understand each other's speech can write messages. But there is the problem of sequencing the ideograms themselves along with the enormous complexity of learning from 1,000 to 22,000 separate signs. As may be seen in Figure 3, which attempts to put the word "dyslexia" in the Chinese code, there are both advantages and costs. Here, perhaps, the left hemisphere is borrowing right hemisphere technology?

To solve the same set of problems in our alphabetic writing, we use a cipher upon the original code, an invention made but once, by the Phoenicians or their precursors, and adopted and changed in application by their cultural descendants including ourselves. (See Figure 4.) Here, basically, each of the sounds in a word is represented by a letter or letter cluster, written in the order and grouping in which the sounds are spoken—all of the words one can possibly want—using only 26 letters and a system. Now this is a simple concept and well within the comprehension of most school-age children. They can understand that ideas are conveyed with words and also that, as Smelt (1976 and 1977, p. 162) puts it, "Words are made of sounds, and sounds are written with letters, in an orderly manner, to impart meaning."

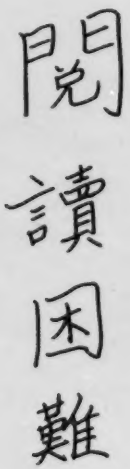

Figure 3

ALPHABETIC LANGUAGE SYSTEMS

Figure 4. Transmission of thought in alphabetic language systems.

It is really a much simpler idea to write in the cipher than to devise the spoken code in the first place, but for many people it seems to add a major barrier to learning. Why? It could hardly be the level of abstraction or the two-step process; primitive astronomy and other activities make at least as great demands. Perhaps it is the necessity for taking the stuff and processes that belong with right hemisphere functioning, first transforming them into the orientation and sequencing patterns that belong to the left hemisphere and then asking the two hemispheres, so different from each other in "temperament," to pull in double harness. This is a neurologically cumbersome kind of activity. The human child, however, seems able to simplify it by transferring the visual processing of verbal symbols—and these only—to the last-myelinated language association areas of the left cortex (Orton 1925; Masland 1967). The child can do this at about the age of five or six or seven, a time of many other maturational changes. According to Bakker (1973), the child up to that age is helped rather than hindered in learning to read by the lack of cerebral dominance for language. It is an advantage later, as Geschwind (1972) has pointed out, to have the whole process being carried on through the cortical *surface* networks in a single brain area, a possibility apparently unique to man.

In any case, we are not born ready to read but we mature and learn in childhood. The capacity to manage this neurological skill is, perhaps, and just in this connection, truly "the latest (and least finished) development in man." The words are Orton's, as is the concept of "establishing the physiological habit of use" in the brain through appropriate educational exercise. Note that this does not make claims about organic change but only of functional learning, of the kind we are well able to do because of our initial plasticity and adaptability. We are inherently able to substitute this kind of learning, a cultural advantage like so many others we enjoy, without waiting for other events. We need not wait for the completion of the

evolution of the kind of visible difference in brain structure already evident in the *planum temporale* (Geschwind 1972; Galaburda et al. 1978) of the left hemisphere which subserves language. Physical evolution takes the species countless eons to develop structures but cultural transmission speeds things up. Perhaps it is useful to think of the development of literacy skills as one of the ways in which we have learned to use technology (print in its various forms) to extend our bodies, our senses, and our basic language capacities, as we do with other cultural inventions. The implication of such an approach may be significant; it is, I think, a new twist in formulation.

We say we know the student *can* learn to use language because one of the strongest, most human characteristics of man is his ability to think and to express himself in symbols. He can do this to such a degree that modern thinkers like Kinget (1975) have renamed him. *Homo sapiens*, man the wise, should be called *Homo symbolicus*, man the symbol user, they say. For it is man alone who, to high degree, can replace and recall with an arbitrary sign that which is different or absent and who can think by manipulating the symbols.

The "angel hiding" theory of creativity (just chip away the marble to find the angel which, of course, was in the sculptor's mind) is changed when it is human beings we are "growing." The angels are alive inside the stone, ready to spring forth, but they need help from their culture if they are to achieve liberation and full growth within human lifetimes—and, perhaps, be able to add to the cultural inheritance that they, in turn, pass on. Some furniture pieces or airplane models are packaged partly unassembled and unfinished, a challenge to make them what they are supposed to be. But with a *person*, it is s/he who does the growing, however much help is needed for "putting it all together."

"But what," you ask, "has all this to do with the discussion of learning disabilities and of specific language difficulties and *their* resultant disabilities?" It seems to me that it is important as the overarching framework from which our considerations hang or, perhaps looking earthward, as the solid foundation, supported by pilings driven through shifting sands to bedrock, on which to build our understanding and practice.

First of all, there are the basic physical and social needs which every person, including every child of whatever origin or status, has a right to have met. There can be an overall impoverishment of life and learning; it should go without saying that such needs should be attended to. This is, at least to begin with, on the level of *being*, more than specifically of *learning*, however much the former undergirds the latter. It is important, but not centrally what we are talking about here.

Second, the individual needs keen eyesight, sharp hearing, and good motor control and coordination for learning through the senses as must be done in school and life. Without these sensory capacities, there must be help of either a remedial or compensatory nature. But a child may be well-equipped to learn through the senses and yet not learn as expected to. Something about the child's learning processes is "disoriented," as it has been so aptly put by McCarthy and McCarthy (1969). This may have to do with perceptual intake, motor ability, activity level, emotional response, or some combination of these and other factors on nonlinguistic or even prelinguistic levels. And so "he doesn't learn as he should." This, in my thinking, is properly classified as specifically "learning disability" at the basic level.

In such a case, the disability may derive from the life history or from the organizational structure but is not language-derived, and the child probably needs prelinguistic or nonlinguistic treatment. The child is not able, *on his own*, to take full advantage of his basic animal heritage and status. He needs help and, unless he is *too* severely handicapped, which is rare, we can give him the help he needs if we are clever enough and persistent enough. The abilities he needs are based on traits which are probably of genetic origin, spread among us on a normal probability curve, so that inherently he has a range of possible development. He may, of course, have been unfortunate in his environment or his birth, so that his potential has been interfered with. Both of such circumstances may set limits on how far he can go, but those limits allow for growth beyond what society may be providing for him. The shape of the normal probability curve may show more individuals at the end representing low functioning because of the inclusion of both inherited and acquired ineptitudes.

At a somewhat higher level of expectation, we find interferences which more closely parallel those of linguistic processing, the thinking disorders which we may label "cognitive" rather than sense-based, perceptual and the like. Some people do poorly on the visuo-spatial subtests of intelligence tests and may fail on tests of mechanics, recognition of faces or other right-hemisphere-mediated thought processes. Often such difficulties do not cause practical or academic disabilities, and so they are not *called* disabilities. One says, as many people do, "I'm terrible at remembering faces," or "I never could paint." Or it might be "model" or "find my way" or whatever. But none of these difficulties are considered to be more than relatively mild idiosyncrasies. When they make trouble for their victims, however, they may properly be called *higher level learning disabilities*—perhaps the learning disability component of adjustment or developmental

difficulties. Some of the social or affective inadequacies of some individuals may well be in this class. With older boys and girls and with adults, it is often difficult to sort out components, but I think these are not specifically language-based however much they may be language-entangled.

It may well be that a child has no learning difficulties on sensory-motor levels and begins to have trouble only when he encounters language. This may show itself early when he hears but does not seem to understand or when his understanding is not adequate for his age and needs. Complicated sentences or multiple commands may be beyond him although his age-mates process them readily. He may be obviously thinking and reasoning well while his speech may be delayed or defective. He may even use spoken language forms precociously although only his mother can translate them (Clarke 1973). He may have difficulties with abstractions like *before* and *after*, perhaps knowing what some of them mean but giving the ideas the wrong labels. Perhaps he stutters, though this may have other causes, or he may have other difficulty with the rhythmic or tonal patterns of his mother tongue (Orton 1928, 1937). His ability to perform may be either delayed or distorted or both.

Here we can begin properly to think of *specific language* difficulties which are not necessarily based on defect or deficiency but on difference in development. I am inclined to think of this as First Stage Language Difficulty or even Dyslexia I (*dyslexia: dys* = inadequate + *lexia* = dealing with words). If the problems presented by the child's speech patterns are enough in kind or degree to make trouble for him, we are likely to say he has a specific language *disability*. Under the circumstances, he is at least temporarily disabled in meeting the demands of his culture, and he needs help from people who understand the variations possible in language development. Such a child's difficulty, if he is not learning-disabled as we have described that condition, seems likely to be of the character of the normal variation in that complex trait, language learning facility. Such a variation seems to be a familial or genetic gift, not correlated with degrees of intelligence, giftedness or ineptitude with such other traits as musical talent, athletic ability or even social aptitude. In this case, we would indeed have a learning problem but it would be specifically with a *language* learning need, and it would require and respond very well to specific and expert teaching.

One can have a language difficulty without having a learning disability. Conversely, one can have a learning disability and still have fluent language skills. There are some, however, whose basic learning problems send them

into the language development periods ill-prepared to cope with the added complications of dealing with words. These are the children in the middle of Figure 1 under the overlapping umbrellas. Shall we call them *learning-disabled* or *language-disabled*? They are both, and we find that a learning-disabled child is, as the jargon has it, "at high risk" of having language learning problems as he gets older.

What difference does it make what we call these children? Very little, I think, in our long-run educational approach to meeting their needs. Most of them need pretty much the same kind of skilled teaching at the hands of people who know language, its pedagogy, and the nature of learning. One of the components of "teaching the language as it is to the child as he is" is to know him as he *individually* is. It is the individual behind the label or the statistics who must do the learning. Often, if he is learning-disabled and so has a next-level language problem, it will take him longer and require harder than average work to free himself of his early handicapping condition. This is not to say that he will not come out as well in the long run as the children who respond more quickly. Against all predictions, I have seen it happen many times. One cannot and should not write people off no matter how unpromising they seem at first. And one should not necessarily lower academic sights; ". . . the impossible takes a little longer!"

After the basic language, pre-reading years there comes that difficult transition to the tasks that underlie literacy, the work of the school years. These are the years when it is the child's job to become competent in the skills that provide the keys to his educational, occupational and personal future. Without all the three "R's" (mathematics here becomes an aspect of language and spelling is included in writing) he will be truly disabled in growing into a modern, literate, technological culture. I need not belabor that point; we know all too well the cost of failure.

Let us suppose, as often happens, that a child enters school at six with *no* history of either basic *learning* or basic *language* difficulty. He "looks ready" and seems to have everything going for him as a future academic "success." And yet, he may find himself in trouble as he tries to master the second level code, or cipher, and to learn to read and write and, perhaps, handle arithmetic. Like my favorite ten-year-old, he finds, "I can think, but what's wrong is my words. I forget them and I can't manage them." There just does not seem to be anything else wrong with him. He simply—or not so simply—cannot seem to learn to read, write, spell or, perhaps, compute. He needs mastery of the written symbol, the last skill acquired by mankind. This child's aptitude for it, while there underneath as we know from others

of his kind, just did not get finished in his Good Fairy's gift box to the point where it is easy for him to catch on. For him, it may be just a bit tough going at first or it may be of intermediate difficulty. Or it may seem almost impossible for him to learn and for his teacher to teach him. This is Specific Language Difficulty, commonly called dyslexia, or as we might say here Dyslexia II. It is not, I emphasize again, a permanent deficiency or defect, but one of the normal variations in the human condition. It is a disability only because without our helping him to come to terms with it successfully the youngster *will be* disabled in meeting his otherwise reasonable goals and expectations. If the right kind of help is forthcoming, the outlook for him is very good indeed. He is *not* learning-disabled; his general learning ability may be, in fact, of any quality up to very good.

A child *may* have been properly categorized either as basically learning-disabled when he was younger or all right as to learning in general but with a specific ineptitude for mastering spoken language. If either (or both) of these conditions has been true and he has had appropriate help in the preschool years, the child will be in better position to take the next steps into literacy than if he had not been helped or had been improperly taught. If not helped or if improperly taught, he will have to start from "behind scratch" but can do so and come through satisfactorily in the end. It will be harder but not impossible. He may have mastered the early language skills fairly

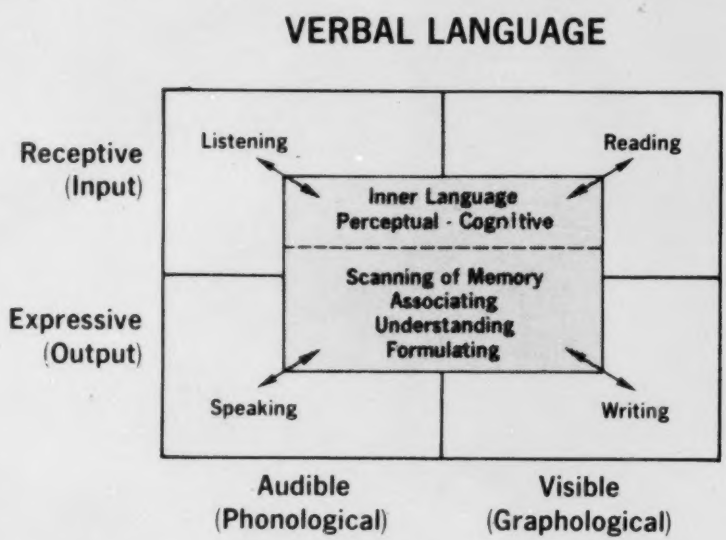

Figure 5. Analysis of verbal language. (After Rawson 1968.)

well and be ready in many ways for academic learning, but he may have persistent difficulties of other sorts. Whether these difficulties are considered "learning disabilities" or the "almost inevitable concomitants of dyslexia"—or whether we say he has a learning disability with a dyslexia component, or whatever—matters only as its consideration helps our thinking about him and about what to do for him.

We have not systematized our approaches to the nature of learning disorders *per se* and their relationship with right-hemisphere functioning. We have also not systematized the relation of learning problems and, especially, language problems to the achievement of purposeful hemispheric interaction for the uses of technology, from alphabet to computer. These considerations need more and better attention. We do, however, have a well-ordered and, I think, true-to-fact schema for the language in terms of its modalities and their relations with one another and their ordering in developmental time. Although many readers of the *Bulletin* are familiar with this type of schematization, I shall repeat it here in order to round out the picture and to point out the components of the language-learning field. (See Figure 5.)

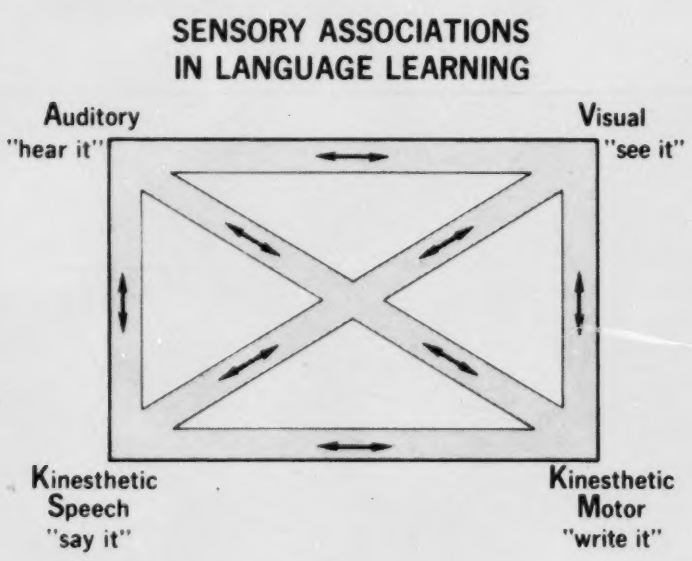

Figure 6. Sensory associations in language learning. (After A.G. Wolff 1970.)

In Figure 5, we see the audible, visible and inner language functions in their developmental order and their relation to incoming, outgoing and cross-modal mental activities. This may serve to keep in focus what is happening, where trouble can break out, and what we may be able to do about it. That all this learning makes its way to the mind through the senses can be signified by fitting the learning diagram of Figure 6 to Figure 5. One sees the connection readily, but there is an important omission. In the center of Figure 6, there should be a luminescent, sparkling "fantasia-like" drawing of the brain, for "mind is the master." It is the part which does the growing and learning, and the brain is its organ. With proper interplay of mind and brain, all humans should be able to achieve language competence up to the level of their other aptitudes and to their needs and appropriate expectations. The innate power is there; read the life of Helen Keller (1964). On a somewhat less dramatic time scale, there are the life stories of Thompson's "men of eminence" (1969) and the many emerged and emergent LD's (language *or* learning difficulty people) we know. As will anyone who has worked in the field long enough, I think of many individuals.

I see the innate power, and new things as well, each time I look at the photograph below (Figure 7) and the self-portrait in Figure 8. In the photo-

Figure 7

graph is a group of live, colorful, happy children with a devoted, vivid, expert teacher. The children are highly unique, learning many things which they proudly show. They come from all three under-the-umbrellas positions but, without stigma, they are all labeled "dyslexic." Their universality is indicated by the fact that though the scene is a public school in Prague, visited by the author in 1971, and the children's language is Czech, they look like anybody's bright little brothers or sister, as do every culture's dyslexic children.

Nov 21, 9156
Figure 8

When he drew the self-portrait in Figure 8, "Harry Wilson" (Rawson 1969) was a bright, intact (as they say) but severely disabled non-reader. Note his appeal for help (left hand) and his determination (right fist). The interview notes of 1956 (see his "9156") bear out what his self-portrait shows of his readiness to climb forward and upward and of his hope and courage despite years of failure. Now, 22 years later, he is a successful, respected, sought-after machinist and a garage owner who is also a husband, father, and a happy, productive citizen whom many local teenagers find a good model.

The Czech children and "Harry Wilson" exemplify the fact that if we can implement the knowledge we now have, we can move toward three goals:

1. To give each individual the best opportunity for general and specific learning, the optima of nature and nurture working together.

2. To teach (expertly) the language as it is (with sure knowledge of it) to the learner (with his human species characteristics) as he is (individually unique in constitution and experience).
3. To keep always in mind both focus on specific learning needs and perspective on education for holistic development and living.

Summary

In summary, we have placed the human in the evolutionary scheme so that we might best consider his ways of learning. We have described his language, specific to his species, in some of its varieties and developmental stages in the race and in the individual. We have talked of the nature of the *disorders of learning* at the prelinguistic levels and in the nonlinguistic areas of development. Finally, we have placed in our schema the *specific difficulties* encountered in the mastery of language skills and suggested, in a general way, appropriate approaches to education, including training, to facilitate or remediate language learning. We have expressed faith, based upon experience, in human capacity to learn language and to teach language to all students, and thus to free the learners for further growth. Throughout, we have tried to keep a balance between focus on a special topic and perspective on the whole of life and the education which prepares for and enriches living.

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Metalinguistic Awareness and Reading Strategies

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A relatively large group of children does not learn to read with traditional methods of instruction in a regular classroom setting. Although estimates of the prevalence of reading disabilities vary according to the definitions used and according to the severity of the disorder, there is a general consensus that at least 15 percent of school age children have significant reading problems (Harris and Sipay 1975). Many factors, e.g., emotional disturbance, mental retardation, or lack of opportunity, can interfere with reading acquisition. A distinct group of children, however, apparently does not learn to read because of a neurological dysfunction in the central nervous system which affects the processing of information. Children who fall into this category are often referred to as having a specific learning disability (Johnson and Myklebust 1967).

Children so classified, however, do not form a homogeneous group since they exhibit variation in complex patterns of strengths and weaknesses in information processing. Some of these children fail to learn to read primarily because of difficulty in auditory processing and in applying phonic word attack skills. Johnson and Myklebust (1967) refer to them as *auditory dyslexics* and Boder (1971) refers to them as *dysphonetics*. Another group, referred to as *visual dyslexics* or dyseidetics, has difficulty processing visual information and remembering the visual gestalt of the word. The tendency of these children is to rely upon phonics when reading. Boder (1971) found the dysphonetic group to be significantly larger than the dyseidetic one, 63 percent compared to 9 percent, respectively. In addition to these two groups, however, there are children who exhibit both auditory and visual processing problems, as well as difficulties integrating auditory and visual information.

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Language Foundations for Reading

Widespread recognition of the importance of language and auditory processing in learning to read is relatively recent. In the past, the visual perceptual difficulties of children with reading problems were emphasized. With the increased interest in the relationship between language and reading, however, most researchers presently view reading as a language-based activity. Johnson and Myklebust (1967) place reading within a hierarchy of language development in which it is preceded by inner language and by auditory receptive and expressive language. Written language then follows. They refer to reading as "visual-receptive language."

According to the information-processing model developed by Johnson and Myklebust (1967), there is a hierarchy of skills necessary for adequate language development. They have divided these skills into groups of abilities. One is involved primarily in the acquisition of receptive language and requires discrimination, comprehension and memory span. Another is involved in the development of expressive language and requires retrieval, formulation, sequencing and syntax, and articulation. By school entrance, a child has acquired considerable competence in the basic use of oral language for communication. Oral language usage has become automatic, with a high degree of skill and mastery over the elements of the language. Reading is a secondary visual symbol system superimposed upon this primary linguistic system (Johnson and Myklebust 1967).

To highlight this relationship, Kenneth Goodman refers to the process of reading as a "psycho-linguistic guessing game" in which the reader, using his previous knowledge of language and the grapho-phonemic, semantic and syntactic cues, predicts what the next word will be from the preceding words. An experienced reader relies more heavily on his language base, the syntactic and semantic cues, while the beginning reader is more dependent upon the visual image provided by the graphophonemic cues (Goodman 1970).

All of these language processes (listening, speaking, and reading) can be viewed as actively using the model of analysis by synthesis put forth by Cooper (1972). Mattingly (1972) points out, however, that synthesis of an utterance is not the same as awareness of the process of synthesis or of the ability to define the individual parts that form the whole. The attention of the listener is not on the speech sounds, words, or syntactic patterns, but on the meaning of the utterance or the intention of the speaker. Language

forms are basically transparent—one sees through them to meaning (Cazden 1972). A person can become aware of synthesizing, however, and can reflect on the linguistic experience in the same way he can reflect on other experiences (Mattingly 1972; Cazden 1973).

Metalinguistic Awareness

Reading is considered not only a language-based skill but one which relies on the reader's awareness of the primary linguistic activity of listening and speaking. It is the child's ability to treat language "analytically" that is of importance in learning to read (Venezky 1973). For example, speech is not a succession of separate sounds that stand for phonemes. As Cooper (1972) states, "There is no place to cut the syllable *bag* that will isolate separate portions /*b*/, /*æ*/ and /*g*/. The syllable is carrying information about all of them at the same time (parallel transmission) and each is affected by its neighbors (context dependence)" (p. 29). Cooper suggests that a person has access to full knowledge of the coding relationships but that this knowledge is implicit. "There is no doubt that in speaking and understanding language, preschool children can automatically discriminate units as small as the distinctive features of the phonemes. They do not confuse *cat* and *bat*, for example" (Gibson and Levin 1975, p. 125).

Cazden (1972) and Calfee et al. (1972) emphasized that difficulty in developing conscious awareness does not usually begin at the perceptual level. Eimas et al. (1971) have shown that even infants respond to changes in phonemes. Messer (1967) found that children aged 3.1 to 4.5 had implicit knowledge of phonology and were able to differentiate words which violated English phonology from those that conformed. Menyuk (1968) also found that by age four children were able to distinguish English from non-English phonological rules. Auditory discrimination training, therefore, is generally training in the ability to reflect on sounds in words and make conscious judgements about them (Cazden 1972).

Children beginning school are developing awareness of aspects of their own language which are necessary to learn to read. All children, however, do not naturally develop sufficient awareness nor can they easily acquire this awareness by being taught (Karpova 1955; Bruce 1964; Liberman et al. 1974). Cazden (1973) labels this difficulty as a lack of metalinguistic awareness which she defines as ". . . the ability to make language forms opaque and attend to them in and for themselves." She views this as ". . . a

special type of language performance, one which makes special cognitive demands, and seems to be less easily and universally acquired than the language performances of speaking and listening" (p. 3).

Metalinguistic Awareness and Reading

Language is a system of rules which vary in complexity and abstractness—the process of language acquisition is one of learning rules (Gibson and Levin 1975). In developing language, the child concentrates first on words containing the most information—content words such as nouns, verbs and adjectives. He later learns to understand and use word order, structure words, word form changes, and morphological markers to define the meaning of his utterances (Brown 1973). According to Brown and Bellugi (1964), these rules are learned through an unconscious process of induction of latent structure combined with imitation and attention to expansion by parents. Lefevre (1964), working under the hypothesis that the "first task of reading instruction should be to give people conscious knowledge of the language patterns they have mastered on the unconscious operational level," mentions three levels of language analysis: (1) phonemic; (2) morphemic; and (3) syntactic.

Each of these levels of language analysis is important to consider in relationship to reading acquisition. First, in reference to the phonemic level, there is a minimum amount of phonological awareness needed for reading. If a child has not abstracted the set of features which make up the phonemes of his language, the establishment of grapheme/phoneme correspondence will be impossible (Warren 1971). Children must learn to isolate phonemes with words in order to apply phonics as a word attack strategy.

> An ability to hear each separate sound in a word, to separate it clearly from the one next to it, and to know out of which sound the word is composed, i.e., the ability to analyze word sound composition, is a very important precondition for correct training in literacy (Zaporozhets and El'konin 1971, p. 169).

The ability to segment words into parts consciously requires metalinguistic awareness, i.e., the ability to reflect upon language as well as to comprehend and produce it. Although generally this skill appears to be developmental (Liberman 1974; Bruce 1964; Zhurova 1963; and Rosner 1975), it is

not always learned spontaneously. Rosner (1974) has found that difficulty with this type of phonemic analysis contributes to difficulty in learning to read.

Lefevre (1964) acknowledges the importance of the phonological level in learning to read but emphasizes that he considers the last two levels of language analysis, morphemic and syntactic, as more important. The most significant signalling systems for these language analyses are: (1) intonation; (2) function order in the sentence; (3) structure words; and (4) word form changes. Lefevre (1964) considers intonation to be the most important of these language devices and the first learned by the child. There are two basic pitch contours: (1) falling contour at the end of a statement, and (2) rising to mark a question. The child first learns the intonation pattern for statements and then for questions. Children with reading problems have been found to have difficulty in recognizing these contours when nonsense syllables are used (Vogel 1975) thus indicating a difficulty in bringing intuitive knowledge to a level of conscious awareness.

By the age of six, most children have developed control over the most important syntactic elements of their oral language (McNeill 1970). Although the use of syntax continues to be refined, all English inflections and morphemes have been found to be present in the vocabulary of first graders (Berko 1958), and preschool children use all of the grammatical patterns used by adults (Menyuk 1971). Gibson and Levin (1975) point out, however, that the features of grammar, like phonology, are opaque. The child uses grammatical rules intuitively before he has the metalinguistic awareness to apply them to novel situations. For example, children are able to apply correct morphological endings to real words that they are unable to apply to nonsense words (Berko 1958; Newfield and Schlanger 1968). Berko (1958) feels that the children have memorized these words in a rote manner rather than having learned the grammatical rules.

It is the hypothesis of this investigator, however, that the children do know the rules, but at an implicit non-conscious level, and do not have sufficient metalinguistic awareness to apply them in non-meaningful situations. Further support is given to this hypothesis by the finding that first graders are able to recognize the correct form of a nonsense word before they are able to produce it (Anisfield and Tucker 1967). The ability to apply morphological rules to nonsense words appears to be developmental and increases from preschool to first grade. A child's control and awareness of the syntactic and morphological elements of his oral language appears to be significantly related to his reading achievement (Weinstein and Rabinovitch 1971; Ruddell 1973; Harris 1975; and Vogel 1975).

Metalinguistic Awareness and Reading Strategies

A child's ability to apply the syntactic elements of his oral language to reading is also related to his reading achievement. Poor readers have been found to use significantly more graphic cues and fewer syntactic and semantic cues (Y. Goodman 1970; Brody 1973; Little 1973). Good readers read in phrase units but poor readers tend to read every word individually without taking advantage of contextual constraints (Levin and Kaplan 1970). It is attention to grammatical constraints that allows the reader to predict what will come next and limit the range of alternatives. Weber (1970) reported that her high-reading group self-corrected errors that were not grammatically acceptable more frequently than her low-reading group.

Our hypothesis was that learning-disabled children with reading problems in third and fourth grade would be deficient in metalinguistic awareness of phonological, morphological, grammatical, and intonational features of their oral language. Although intuitive knowledge of language rules might be adequate, we suspected that they would have difficulty in isolating and applying these rules in novel situations. We expected this difficulty with metalinguistic awareness to be related to the ability to apply phonic word attack skills to reading as well as to the adequate use of grammatical cues in reading. This hypothesis led to the study reported below.

The Study

Purpose of the Study

The primary theoretical issues of this investigation included the following:

1. Do learning-disabled children with reading problems have less conscious awareness of the intonational, phonological, and grammatical features in oral language (metalinguistic awareness) than efficient readers?
2. Are learning-disabled children with reading problems less able to apply strategies using grapho-phonemic cues, and grammatical relationships in oral reading?
3. Is the development of metalinguistic awareness a general type of ability involving all areas of language?
4. Is metalinguistic awareness related to a child's ability to apply phonics and grammatical relationships in reading?

Selected Sample

Children were selected from schools in middle to high socio-economic areas of suburban Chicago. The final sample contained 26 boys divided into two groups: one group of 14 learning-disabled readers (LD) and one of 12 proficient readers (PR). The children in the learning-disability group had been tested and diagnosed by their school district or other appropriate professional personnel. They were all enrolled in a learning-disabilities resource program, a self-contained learning-disabilities classroom or a private school for learning-disabled children. The proficient readers were enrolled in regular classrooms and were not receiving special help in any areas.

Tests were administered to determine if there were significant differences between the groups in age, intelligence, reading, or spelling. Results indicated that there were no significant differences between the groups in intelligence or age. Scores for the LD children on the Slosson Intelligence Test for Children and Adults (1971) ranged from 97 to 123 with a mean score of 108, and for the PR children from 101 to 124 with a mean score of 114. The difference between these means was not significant at the .05 level. The mean age of the LD children was 10.1 years and of the proficient readers 10.0 years. Again, the difference between these means was not statistically significant. Ages ranged in the LD group from 9.3 to 10.8 and in the PR group from 9.1 to 10.8 years.

There were significant differences at the .01 level between the LD and the PR groups on the Gray Oral Reading Test (Gray 1967) and the Wide Range Achievement Test (Jastak and Jastak 1965) Subtests of Reading and Spelling. The LD children had a mean score of grade 1.8 on the Gray (ranging from 1.1 to 2.3), grade 2.6 on the WRAT Reading (ranging from 1.8 to 3.6), and grade 2.5 on the WRAT Spelling (ranging from 2.0 to 3.0). The PR children had mean scores of 6.4 (ranging from 2.0 to 10.4), grade 6.9 (ranging from 4.5 to 9.0) and grade 5.8 (ranging from 3.9 to 9.2) respectively on these tests.

In summary, the children in the LD and the PR groups did not differ significantly on socio-economic level, general language abilities, language background, intelligence, or age. The learning-disabled readers were significantly lower than the proficient readers in oral reading in context, oral reading of single words and spelling.

Experimental Tasks

A battery of experimental tasks was given to measure the development of metalinguistic awareness of intonation, phonology and grammar. Specific

analyses were also done using the oral reading errors of the children to determine their use of phonics and grammatical relationships as word-attack strategies. Following is a brief description of selected tasks to illustrate the kinds of abilities presumed to be involved in metalinguistic awareness.

Metalinguistic Awareness of Intonation. Six tasks were designed to test metalinguistic awareness of intonation by measuring the child's ability to (1) recognize and (2) express the characteristic intonation for a statement and a question. There were four subtests requiring the child to recognize whether or not he was being asked something or told something and two subtests where the child had to apply correct intonation to indicate whether or not he was asking or telling something. All materials in the recognition tasks were recorded and played on a Bell and Howell Language Master so that the only cue was an auditory message. Three of these tasks will be discussed in more detail.

One recognition subtest involved real words marked only by intonation. For example, the child would hear sentences like these: "The cat is sitting down" or "The black dog is eating food?" and be asked, "Am I asking or telling you something?" Another recognition task used sentences developed by Susan Vogel containing nonsense words. For example, "In san lepth it cull be sontar sumution," and "Koo you klee to ake sanch in droll?"

In one of the recall tasks, the children were asked to repeat real words, first as a statement and then as a question without changing the order or adding or subtracting any words. For example, given the words *I - eat - dinner*, the child was expected to say first, "I eat dinner," and then, "I eat dinner?"

Metalinguistic Awareness of Phonology. The tasks measuring metalinguistic awareness of phonology were divided into two parts: (1) discrimination and (2) isolation and manipulation. There were two discrimination tasks. The first consisted of half of the items on the Wepman Auditory Discrimination Test (Wepman 1973) which measures the ability to discriminate sounds in real words. The second consisted of pairs of nonsense words based on the contrasts present in the Wepman test. For example, Wepman: *web wed*; nonsense: *wab wad*.

Dependent on the ability to discriminate sounds in words is the ability to isolate the phonemes in a word consciously and manipulate these sounds. Several tasks were used to measure the child's ability to isolate and manipulate sounds in words. One task required the child to indicate the number of sounds he heard in real and nonsense words with plastic chips. The words ranged in difficulty from two letters for two sounds (*on*) to seven letters for only five sounds (*chicken*). Another subtest involved the isolation

and manipulation of sounds in real and nonsense words. It involved learning a code language similar to Pig Latin in which the child had to isolate the first sound of a word, put it at the end, and then add the syllable *ub* to create the code word. For example, the word *dog* would become *ogdub* and *magazine* would be *agazinemub*. The second part of the Lindamood Auditory Conceptualization Test (Lindamood and Lindamood 1971) was also used. This task measures the child's ability to isolate sounds within nonsense words and associate those sounds to a pattern of colored blocks.

Metalinguistic Awareness of Grammar. One task used to test the development of metalinguistic awareness of grammar was the Berry-Talbot Language Test I (Berry 1966) which measures the child's ability to apply grammatical ending to nonsense words. For example, "This is a spuz, now there is another one, there are two of them, there are two_____ ." "This is a tass who knows how to gizzle, he is gizzling, he does it every day, every day he_____." This test measures the child's ability to apply regular morphological endings in many areas including plurals, present progressive and past tense verbs, comparatives, and superlatives.

The above discussion gives a brief overview of some of the tasks used to measure the child's development of metalinguistic awareness of intonation, phonology and grammar. Following is a discussion of two analyses of reading errors used in this study.

Reading Error Analyses

The first error analysis was devised to measure the child's ability to apply phonics to his reading (the Phonics Ratio). It was thought to be particularly important to measure the child's application of phonics rather than his knowledge of letter sounds in isolation since many children know the letter sounds but cannot apply this knowledge when reading. The second analysis measured the child's use of grammatical relationships in reading. It was thought that this would give an indication of how much the child was using his knowledge of language structure to help him decode words.

In very simplified terms, the Phonics Ratio consisted of an analysis of the child's reading and spelling errors which determined the ratio of the number of correct letters or spelling patterns in proper sequence to the number of sounds in the word (see Figure 1). (A more detailed description is available on request.) In the first pair of words in Figure 1, *cuk* for *cook*, the initial and final sounds are correct, giving a ratio of 2/3 or .66. In the response, *back* for *block*, the /*b*/ and /*k*/ sounds are correct, giving a ratio

of 2/4 or .50. In the third example, *hoe* for *how*, the ratio is 2/2 or 1.0 since /o/ is an appropriate pronunciation for *ow*; in the last example, *feet* for *finger*, only one sound is correct, resulting in 1/5 or .20.

Figure 1
Phonics Ratio Sample Scoring

Stimulus	Response	Score
COOK	CUK	2/3 .66
BLOCK	BACK	2/4 .50
HOW	HOE	2/2 1.00
FINGER	FEET	1/5 .20

The Miscue Reading Inventory (Goodman and Burke 1971) was used in modified form to measure the use of grammatical relationships. Errors made in oral reading of paragraphs were analyzed. In general, this analysis consisted of determining whether or not an error made sense grammatically in the sentence in which it was found and whether or not it was self-corrected. For example, in the first sentence in Figure 2, one can see that the child has self-corrected the only error that was not grammatically correct, *pay play*. The other errors are appropriate to the context. It is logical to say,

Figure 2
Sample Oral Reading Errors

ONE DAY FIVE CHILDREN WENT OUT

PAY SC A
TO PLAY IN THE BEAUTIFUL

WINTER
WHITE SNOW.

SUE LIKED TO WEAR PRETTY

COLORS
COLORED DRESSES.

WANT
THE CHILDREN WERE WAITING

FOR THE PARADE TO BEGIN.

"One day five children went out to play in a beautiful winter snow." In the second sentence, the error is correct up to where it occurs: "Sue likes to wear pretty colors," but not with what follows "colors dresses," indicating a partial use of grammatical cues. In the last example, the error is not grammatically correct with the preceding or following context: "The children were want for the parade to begin," indicating no use of grammatical structure.

Results and Discussion

In order to determine if the learning-disabled readers differed from the proficient readers in metalinguistic awareness of intonation, phonology, and grammar, three multi-variate analyses of variance were computed using the Wilkes Lambda criterion to develop an approximate *F* test. Also, subtests in each category were compared simultaneously to determine if differences in the pattern of scores existed. Univariate *F* tests on each individual subtest were done to determine which tasks showed significant differences between the groups. Univariate *F* tests were also computed comparing the two reading error analyses to determine if differences existed between the groups in their ability to use the oral reading strategies of applying phonics and grammatical structure. In order to determine if there were correlations of the metalinguistic awareness tasks with each other and with the reading error analyses, Pearson Product Moment Correlations were computed for every variable with every other variable within groups and for the combined groups.

The results of the study indicated that the LD children differed significantly from the proficient readers on *all* measures of metalinguistic awareness: metalinguistic awareness of phonology, intonation, and grammar (see Table I.) It is interesting to note that the secret code game was the most significant discriminator of the language tasks between the two groups of children. This task predicted 100 percent of group membership: none of the LD children and all of the proficient readers could complete the task. There were also significant differences in the children's ability to use phonics and grammatical relationships in their reading (see Table II.) The phonics ratio showed particularly significant differences (mean .54 vs. mean .81) and there was no overlap between the scores of the two groups (LD range from .38 to .64 and PR from .70 to .92).

These results support the hypothesis that LD children with reading problems have less conscious awareness of the intonational, phonological

Table I
Mean Scores on Metalinguistic Awareness Tasks
for LD and Proficient Readers

	MLA Phonology	MLA Intonation	MLA Grammar
LD Readers	59.1	30.2	82.4
Proficient Readers	124.8	39.5	98.8
Significance Level	$p < .001$	$p < .01$	$p < .01$

Table II
Mean Scores for Oral Reading Error Analyses
for LD and Proficient Readers

	Phonics Ratio	Gram. Relations
LD Readers	.54	59.4
Proficient Readers	.81	81.0
Significance Level	$p < .001$	$p < .01$

and grammatical features of their oral language—in other words, less metalinguistical awareness. It is also apparent that LD children are less able to apply strategies using phonics and grammatic relationships or language based cues in their reading.

The final issues and perhaps the most important are whether or not metalinguistic awareness is a general type of ability related to all areas of language and whether it is related to the reading strategies used by the children. Table III shows the correlations between all of the tasks of metalinguistic awareness. There are very strong relationships (significant at the .001 level) between all of these tasks. Metalinguistic awareness of phonology correlates with metalinguistic awareness of intonation and grammar, and metalinguistic awareness of intonation correlates with metalinguistic awareness of grammar.

Table III also shows correlations between the metalinguistic awareness tasks and the use of reading strategies. Again, a very significant relationship exists between all of the measures of metalinguistic awareness and the ability to use phonics and grammatical relationships in reading. It is

Table III
Pearson Product-Moment Correlation Coefficients
for All Tasks in the Combined Group

	MLA Phonol.	MLA Gram.	Phonics Ratio	Grammatical Relations
MLA Intonation	.68**	.70**	.63**	.62**
MLA Phonology		.64**	.90**	.61**
MLA Grammar			.46*	.51*
Phonics Ratio				.66*

*Significant at the .01 level.
**Significant at the .001 level.

particularly interesting that metalinguistic awareness of phonology, a purely auditory ability, correlates .90 with the phonics ratio. It appears, therefore, that (1) the development of metalinguistic awareness is a general kind of language consciousness and (2) it is closely related to the kinds of strategies a child is able to use when reading. Children with underlying weakness in metalinguistic awareness show difficulty in the efficient use of reading strategies. It is apparent that these subtle language problems involving the ability to discriminate, isolate, and manipulate elements of oral language relate to the application of rules in reading. Since reading is a language-based activity and develops after oral language, a deficit in conscious awareness of oral language can be expected to produce difficulties in learning to read.

Discussion and Implications of the Study

There may, however, be one underlying ability that is responsible for the development of the skills involved in metalinguistic awareness and the application of phonics and grammatical relationships in reading. Both the oral language and the reading tasks involve the abstraction and application of rules. Gibson and Levin (1975) have developed a theory of information processing in relationship to reading which support this hypothesis. They assert that there are two basic assumptions about reading: (1) reading is a cognitive process that starts with the perceptual level and ends at the

conceptual level, and (2) the basis of language (and, therefore, reading) is abstraction. The child must learn that objects have distinctive features relative to each other and that events are invariant and occur over time. From establishing the relationship between the distinctive features and invariance, the child forms higher order structures or hierarchies. These hierarchies are sets of rule systems which the child uses to organize his world. The processes through which the child must learn are: (1) abstracting the essential characteristics (the features and variants) through differentiation; (2) filtering out or ignoring irrelevant characteristics; and (3) developing progressively better strategies for abstracting and filtering. As learning progresses, one becomes increasingly specific in terms of the features that can be extracted, is better able to attend to the relevant features, and increases the economy with which information is processed. For example, in reading, the child becomes more and more able to use larger units in his processing, moving from the single letter to words, phrases and clauses.

The LD readers appeared to have difficulty abstracting and applying the rules both in language and reading. They had trouble abstracting the features relevant to the intonation patterns and ignoring irrelevant stimuli such as the statement structure or the nonsense words. They had difficulty abstracting the relevant criteria when isolating sounds in words or applying endings to nonsense words. In oral reading, difficulty in the application of phonics appears to be due to problems in abstracting the features and invariant events such as spelling patterns and sound/symbol correspondence and organizing this knowledge into efficiently used rule systems. They had difficulty developing economy in their processing of reading material and were not able to use language structure cues as well as the proficient readers. LD readers appear to have an underlying difficulty in abstracting the relevant features and invariants to form rules in both oral language and reading. Thus, they have problems in developing efficient use of cueing systems.

These findings are important for planning appropriate remedial strategies. Since correlation does not imply causation, direct training of the skills required for performance on specific subtests not directly related to the act of reading may not be appropriate. This has been so for some other training programs developed directly from diagnostic tests. More research must be done to determine if it is an underlying problem with the abstraction and application of rules that is responsible for the learning-disabled reader's difficulties in developing metalinguistic awareness and efficient strategies for word attack. More generalized training on how to abstract the essential

features, ignore irrelevant characteristics and explore the stimulus may be warranted. Children may need training in recognizing relevant features and invariants to help them structure their thinking into higher order rule systems. Bringing these rule systems to a level of consciousness so that they can be applied in novel situations may require special instruction.

These results also emphasize the need for a high degree of structure when teaching concepts and skills to learning-disabled children. Since consciously recognizing rules appears to be an area of difficulty, material presented must be highly structured to highlight the rule systems. The child should not be expected to induce the rules through a discovery technique based on the ability to make intuitive generalizations. In other words, although work on developing the ability to recognize rules is important, it may not be the most effective way to teach specific skills. It may be necessary to give the child a means of circumventing his deficit areas to insure more rapid acquisition of skills.

The phonics ratio was found to correlate very highly with many of the metalinguistic awareness tasks. It is important, however, to note that the use of phonics was also found to correlate significantly with the child's use of grammatical relationships in oral reading. Since the learning-disabled reader seems to have difficulty in using all of the cueing systems efficiently, training should emphasize balanced work on all levels: single letters, words, phrases, sentences, and paragraphs. Too much work on the application of phonics may interfere with the child's ability to acquire the use of language based cues.

In addition, since LD readers seem to lack metalinguistic awareness of syntax, the application of syntactic cues in reading may be more difficult for them to learn. Emphasis on developing conscious awareness of the syntactic rules in oral language may be helpful in learning to apply this knowledge efficiently in reading. When initially attempting to develop the use of language cueing systems for reading, materials should be kept well within the child's fluent reading level. All of the words should be in the child's sight vocabulary and easily recognized so that his attention can be focused on the structural elements present in the language.

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Limerence, Language, and Literature: An Essay

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The *New York Times* recently introduced me to a new word, and I pass it along to you. A new word is a precious gift and this is a lovely one: *limerence*. It means being in love, or falling in love. I have a feeling of limerence for language and I want my students to feel the same way. I want each to be a language *limerent*. A wise person once said that the goal of education is to infect students with non-poisonous passions. A child who develops a love of language and an ear for language is vulnerable to just such passions. How can we encourage this vulnerability?

I believe that the child who is not afraid of words, written or spoken, will have fun with them, will collect them as treasures, will not feel the need to treat them with undue reverence, and because he can listen to them and comprehend them, he will use them to express his ideas and emotions. The child thus builds a platform of language from which to launch abstract thinking. Such a child is free to venture, risk, learn, and create.

The child who has not been taught these skills, who lacks exposure, or who is language-impaired (diagnosed or undiagnosed), needs help. Without help, unfamiliarity will beget avoidance, which in turn reinforces the unfamiliarity, and thus a pattern is established. We can break that pattern by providing familiarity and informality. We can help the child play with words, embellish words, make big words (real and nonsense), coin words like limerence, find root words, and invent words. Language is constantly changing and children, as well as grown-ups, should have some of the fun of that change.

This essay is adapted from a presentation at the 28th Annual Conference of the Orton Society November 1977, in Dallas, Texas.

For the beginning reader, or the dyslexic child, we must separate accuracy in deciphering from linguistic pleasure. These two things must be presented separately, even though they are flip sides of the language coin. Nevertheless, although I encourage enjoyment of words, and active, inventive participation in hearing and reading stories, accuracy must come first.

Picasso had mastered precise drawing before he took liberties with it. E. E. Cummings could write in iambic pentameter when the occasion demanded, and Stravinsky understood the rhythm of Mozart and the harmony of Beethoven. I am in no way endorsing reading by drift.

I was appalled to hear a professor say recently to a class of potential reading teachers, "Do not allow children to get into the habit of reading aloud, or reading word by word. Instead they should read to themselves from the very beginning and infer the meaning of unknown or unfamiliar words. The general idea matters much more than the specifics." I strongly challenge this point of view for the beginning reader or the reader who has had trouble learning to decode. I believe we must honor children's intellects by seeing to it that they have a well-sharpened tool for decoding their world. Let us not send them out to chop wood with blunt axes. That is not only time-consuming and frustrating; it is dangerous! Reading without receiving what the writer intended is not only unproductive, it is dangerous.

Encouraging a child to confuse some vague mental meandering with real reading is dealing a potentially deadly blow to the child's self-concept. The world is big and confusing to children. The printed page is meant to offer knowledge and understanding, and it provides these to people on all sides. Children who take senseless gibberish from this same source must then infer that they are either stupid or crazy. It is our job as teachers to make sure that fundamental decoding skills are intact before we turn our students loose to read silently and independently. In my experience children do not resent this. I see them enjoying this code-cracking for its own sake. They are little 007's, solving mysteries and feeling a glow of satisfaction when they've done it.

In academic progression, the skill of reading must first be a goal. Then skilled reading can be used as a tool. But a child's exposure to words must not be limited to those he can read by himself.

A child whose personal lexicon is filled with words of texture, strength, and nuance not only has many ways of expressing his own thoughts, but many ways to meet the writer when he comes to later, more sophisticated work in which reading is a tool. So much of the reading we all do consists of matching the expectation in our head to what our eyes find as they travel

along a line of print. Katrina de Hirsch (1975) refers to this as "casting a linguistic shadow." With it the reader can move right along at a pace which allows for appreciation of cadence, rhythm, and humor. Without it, the process of analyzing each word, one at a time, is so cumbersome, and takes so much attentional energy, that the beginning of all but the shortest sentences has been forgotten by the end. All humor, except the comic strip, is lost to such a reader. Even the pun will probably slide away.

The child who relies only on phonics will read laboriously. The child who only knows how to read sight words would do well in China where language is ideographic, but will be stumped by the unfamiliar in English. Worry about the child who ignores context clues in reading and as a result reads *house* for *horse*. When asked, "Does that make sense?" this child is apt to answer, "No, but that's what it says."

While the child of an architect and the child who lives on a farm are not immune to a *house/horse* error, it is probably a mistake neither would make. Language is a powerful context clue. It's what joins reading and common sense.

As is often the case, children make your point for you, as two nine-year-olds did for me last year. One child is a constant storyteller, story listener, storylover who had had a very difficult time learning to read. The other is an obedient little child with tight pigtails who was literally language impoverished. I don't think she ever had a story read just to her. They were working together, rehearsing a short play with a jungle setting. They read these two sentences.

> One said, "Quit it. There's a hung elephant. Wait for my single."
> The other said, "Quiet! There's a huge elephant. Wait for my signal."

I'm sure you have no trouble deciding which sentence belongs to which child. A child who is used to rhythm, dialogue, cadence, and story line would be virtually incapable of making an error such as that one.

In *The Dragons of Eden*, Carl Sagan tells the apocryphal story of the computer famous for translations. It turned "Out of sight, out of mind" into "invisible idiot," a perfect illustration of mechanical language, accurate but meaningless! Consider these two quotations: from a report card, "This boy must not become dissolutioned"; at the supper table, "Last year's soccer team was underfeeted." Would that I could draw! We need to think about language and words, and teach our children to understand the ones they use, not merely to mouth them.

The polite child who learned obediently to decode in the first and second grade but who begins to flounder in third grade may be showing that he doesn't need help in phonics; he needs help in syntax, punctuation, and the meaning of what he is reading—in other words, language.

It used to be thought that language developed as a result of reading and other print based activities. Current research tells us that the existence of language inside the child is prerequisite. The language has to exist inside the child to give incoming information something to stick to. When it is there, the language and the new information join together like the two sides of a closing zipper. When the language is not there, the new information runs off the way salad dressing is meant to run off Scotchguard. The child who drops his voice at the end of the printed line instead of at the period, and then starts up again, falsetto, at the beginning of the next line, needs help in hearing whole sentences. And surely he won't speak them or write them if he doesn't hear them. One cannot express what one does not have, and therefore receptive language is prerequisite to expressive language. Listening and reading are both receptive language activities.

If you are a teacher, do not be afraid and do not let the parents who seek your help be afraid of spoiling a child by reading to him. Let him catch language from you and from his parents through literature.

Although many parents, and some teachers, groan at the prospect of reading aloud to children, there is no greater way to expose a child to language. Consider the wise words of Dolores Durkin (1976), "Language is as much caught as it is taught."

In addition to enhancing language, reading aloud has at least five other benefits we should consider. These are important to all children, but they are vital nourishment for the disabled reader.

1. Concept development and the intake of new information.
2. Awareness of the existence of, and difference among, biography, adventure, poetry, propaganda, and romance (to name a few).
3. The comfort of bibliotherapy when needed.
4. The opportunity to feel empathy.
5. The opportunity to share feelings and experiences with a group, be it a family group or a class.

In trying to puzzle out the reasons for reluctance to read aloud (and laziness generally isn't one), I've unearthed some surprising fears and foibles.

The first is a fear that in some way it is "spoiling" the child to read to him once he, theoretically, has learned to read by himself. I'm going to use "him" because statistically boys need more language help than girls and at the same time parents (and I'm afraid some teachers) are more apt to read to girls than to boys.

"Shouldn't he be reading to me?" a parent will say. "After all, he's learning to read in school. Shouldn't he practice at home?" Yes, if he wants to, but that is no substitute for reading aloud to him at home or at school. It will be years before the child can read on his own the kind of language and vocabulary he needs to hear in stories.

"But what should I read?" is the next question and touches on another fear or foible, one to which parents are particularly susceptible. One fear is that they won't know how to pick "the right book," and flanked by this is a fear that if they give in they'll be chained forever to reading *Freddy and His Tractor* or *Debbie Takes a Nap*.* Ghastly! *Freddie and His Tractor* is a boring hateful little book—but not so little that it doesn't take a whole half hour to read, and don't try to skip. There is a quality in some books written for children that makes reading them humiliating to even a dedicated, self-sacrificing parent. The parent will read it if forced to, but not taking it seriously, will remain apart from it. The child detects both the distaste and aloofness immediately, and lacking in experience, attributes it to the activity, not to the literary selection. The parent's noble sacrifice is useless and the child is disappointed.

There is a different way of approaching the problem that may do away with both fears and foibles. Help the adult find his or her own favorite kind of story, written on a level appropriate for young listeners. Then the adult taste can be honored while the child is being introduced to something pleasurable and new. The fun is in identifying some patterns and then seeing how often we can find them. Each time a child does this, it helps him develop an awareness of these patterns. Each heightened perception augments enjoyment and understanding. The linguistic shadow can be as important here as it is in sentence structure.

I believe we can find entertaining and important literary themes in well-written children's books, as well as in the classics and books written for the adult popular market. Great dreams and stories are found in slender volumes as well as in thick ones. A book is not a sirloin steak which needs to measure two inches thick to merit adult attention and whet the appetite, though many adults do not know this—yet.

Freddy and His Tractor and *Debby Takes a Nap* are mythical generic examples of supermarket kiddie-book literature.

For our purposes here, let us take three themes and see if the idea works. For the first, let us try this one:

PSYCHOLOGICAL FORCES AT WORK IN THE COMMUNITY: pity, greed, passion, sacrifice, love, and death. For a first grader? Yes.

Consider *War and Peace, Gone with the Wind, Middlemarch, and Charlotte's Web*. In this exercise, I suggest that they are all the same story. They come in different depths and on different levels, to be sure, but they are still the same story. The first three (the so-called adult ones) are laced with social and political history. All kinds of people and many kinds of values are represented. Economics collide with idealism against an agrarian backdrop. The same is true of the fourth!

I dare the scholar's scorn as I write this, but can you return these two quotes to their rightful covers?

> Although he loved her children and her grandchildren dearly, none of the new ones ever quite took her place in his heart. She was in a class by herself. It is not often that someone comes along who is a true friend and a good writer._____was both.[1]

> For the growing good of the world is partly dependent on unhistoric acts; and that things are not so ill with you and me as they might have been, is half owing to the number who have lived faithfully a hidden life and rest in unvisited tombs.[2]

In *Charlotte's Web* some of the characters are animals, but they act the way people act. They have dilemmas, as real people do, and a human balance of good and bad qualities apiece. Even Templeton, the rat, has moments when the noblest among us must identify with him.

Fern and her father collide early in the story. Mr. Arable, whose name is a beautiful linguistic joke, is a knowledgeable farmer, well-meaning father, keeper of the Ten Commandments, and also family provider. But he appears to Fern as a cruel supporter of a double standard. Her vision has not yet been clouded by worldly compromise between money and morality. Their disagreement involves a choice between practicality and compassion. Should Wilbur be killed? Which should win? What of the leader who makes the cold-blooded choice? How would you feel about him as a father, as a husband, as a town councilor, a tax collector, a minister, or perhaps a

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[1]E. B. White, *Charlotte's Web*, p. 184
[2]George Eliot, *Middlemarch*, p. 613

doctor? If he were your physician, would you dare to get sick? The arguments on each side are familiar to readers of New Testament parables, Sinclair Lewis, and the Watergate Tapes, as well as of the four books cited above.

How many of us have shared this with Wilbur? "Wilbur was merely suffering the doubts and fears that often go with finding a new friend. In good time he was to discover that he was mistaken about Charlotte. Underneath her bold and cruel exterior she had a kind heart and she was to prove loyal and true to the very end."[3]

Or this, "I don't want to die!"[4]

Charlotte is the practical achiever, as is the team of Arable and Zuckerman. Both are loving, both are sure of right as they see it but they are on opposite sides. Who will win and how can the author apportion victory without defeating virtue?

In the case of *Charlotte's Web*, the device is just the same as it is in the other stories. It is done by shifting the focus to a newly developing trait in a familiar character. The balance of the story is thus instantly shifted and a new tack is permissible. Enter love!—a new kind. I'm not going to try to draw any parallels between Rhett Butler in *Gone with the Wind* and Henry Fussy in *Charlotte's Web*—but don't tell Fern!

There are the other citizens of every town, every life, and every other good story of this kind; the gossip who spreads the news and repeats herself (in *Charlotte's Web* it's the goose). There is the caste-conscious snob who points out that lambs don't play with pigs—the same way Montagues do not talk to Capulets, Frenchmen do not do business with Germans, and fourth graders do not sit beside second graders on the school bus.

And who is a more familiar character than the anxious mother, proud of an untidy son and worried about a daughter who is not yet socially mature? No surprise when she is comforted by a kindly, wise old country doctor.

Wall Street, Russia, and the Old South know the men of affairs whose efforts succeed. So does E. B. White.

> A great feeling of happiness swept over the Zuckermans and the Arables. This was the greatest moment in Mr. Zuckerman's life. It is deeply satisfying to win a prize in front of a lot of people.[5]

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[3]E. B. White, *op. cit.*, p. 41
[4]*ibid.*, p. 51
[5]*ibid.*, p.160

It's all there in 184 pages which bring forth tears, laughter, suspense, and transportation into another world. "Salutations," as Charlotte herself might say, to all writers who are "humble," "versatile," and "radiant."

One might imagine George Eliot, E. B. White, Margaret Mitchell, or Tolstoy saying of their artistic aim, "It is not to resolve a question irrefutably, but to compel one to love life in all its manifestations—and these are inexhaustible."[6]

Which one said this?

> If I were told that I could write a novel in which I could indisputably establish as true my point of view on all social questions, I would not dedicate two hours to such a work; but if I were told that what I wrote would be read 20 years from now by those who are children today, and that they would weep and laugh over it, and fall in love with the life in it, then I would dedicate all my existence and all my power to it.[7]

This description fits all four books. It was written by Tolstoy.

I am not advocating that *Charlotte's Web* take the place of *War and Peace*, or either of the other two books, but I am suggesting that the adult who enjoys one will enjoy the others. The child who is introduced to this kind of book by way of one like *Charlotte's Web* will find the territory hospitable and familiar, and hence will probably journey there independently in later years. And there are many, many other books, beautifully written, which fit in this category.

Shall we try *HUMAN NATURE: good or evil?*

Children (and philosophers) have wondered about this forever. Is it gentle and benevolent to be encouraged and set free? Is it dangerous, something which must be contained by powerful bonds?

If you feel like wrestling with the good or evil question (it's good in January), there are many ways of enticing the child into your realm without forcing him to blow his cover—which would not be fair.

One way is to start by making a collage—it could be one of the class as a group, or each member of the class could make one. Start with a huge stack of magazines, a shirt cardboard for each collage, some newspapers, and catalogues. The catalogues are vitally important because they make people look athletic, stylish, intellectual, or slender according to their bias, and

[6]Leo Tolstoy, *War and Peace*, Introduction, p. 10
[7]*ibid.*, p. 10

each person's collage should have a good dose of wish fulfillment. Take your scissors and cut out pictures of anything you think describes you, or the group. Don't forget words, either by themselves or made from cut-out letters. The more variety you get, the better. Along with the picture of you in stretch pants, don't forget to put the picture of the ice-cream sundae you never can resist, or a few words that aren't laudatory; broke, tired, on edge, and plump are a few I might choose for myself. Paste them on the cardboard in whatever way makes an interesting design and is pleasing to your eye. Just the process of sharing the magazines, cutting, pasting, and laughing over the finished product (and assessing its accuracy) is a perfect preamble to an intellectually difficult task.

The mark of a mature mind is to be able to hold two opposing ideas at once which is to say, to be comfortable with ambiguity. Don't expect this of most children below the age of eleven or twelve, which, as we know from Piaget, is the age when abstract thinking develops as part of formal operations. For children younger than this, the simple process of sorting good from bad is fun, and lays good foundations for later more complicated thinking. A wonderful book to begin with might be *The Bad Island* by William Steig. For majestic language it can't be matched. There are huge rumbling words children love to hear long before they can pronounce them or use them independently.

The Start of the Battle

> Eventually things really got out of hand, or out of claw and talon. From blaming, and cursing and insulting, and threatening and insulting and hitting, they went on to serious fighting. And all their deepest demons of hate broke loose. Much as they had all loathed and abominated one another before, it was nothing compared to the way they loathed and abominated now. But loathing and abominating no longer gave them enjoyment.[8]

The Battle

> It went on and on and on and one day it was finally over. Everyone had succeeded in killing everyone else off. The last ugly ogre had given his last ugly gasp and the last serpent breathed its last flame and the island was a gigantic heap of dead, scaly, thorny, fanged, horned, bug-eyed, barbed, bristling, saw-toothed carcasses, lying in ashes and

[8] William Steig, *The Bad Island*, p. 20

embers, burning and giving off a dark, horrible smoke. And then there was nothing but hot ashes.[9]

The denouement belongs to Steig and his readers, but there is no ambiguity. His good is a good as his evil is evil. What fun! And no, the children won't be scared. Progress from there to sorting good children from bad children. Stevenson's *A Child's Garden of Verses* is ideal for this, as are *Cautionary Verses* by Hilaire Belloc, or the *Goop Books* by Burgess. They are fun to read aloud. Even a child who would otherwise feel too old to be reading "baby-stuff" will enjoy reading children's poetry searching for adult distinctions. And all children will feel a warm rush of superiority reading about other children who are totally bad. Then, with your collages spread out in front of you, read parts of Walt Whitman's *Song of Myself*. A word of caution. I feel about that the way I do about the Museum of Natural History. The temptation is to go from the Hall of African Mammals, to the Dinosaurs, to the Plains Indians, to the Blue Whale, then the Hall of Gems and Minerals, saving the Planetarium for last.

Don't.

Choose one and force yourself to leave after you've seen it. The same is true of the *Song of Myself*. Take a little section at a time. Then, if you would feel comfortable with this next step, set up a dialectic between Whitman in this poem and Golding in *Lord of the Flies*. The latter is something you can read and retell to children of almost any age, distilling and embroidering as seems appropriate. There are so many parallels the child will bring in from real life: rules in school for instance. Are they necessary? Would people be the same without them? Who should enforce them? What is scary and what makes people feel safe?

One discussion of this led a father (highly placed in the New York corporate scene) to say of his daughter's observations, "I feel exactly the same way she does—except she's talking about the playground and coming home from school, and I was thinking about the office and commuting."

Hans Christian Andersen's *The Little Mermaid* is a prismatic view of what it means to be human. With this in one hand and Anne Lindbergh's poem about the Mermaid in the other, you have a feast for mind and soul of any age.

Let's try a little magic. "People think I am _____, but really I am _____" is taken from Kenneth Koch in *Wishes, Lies, and Dreams*.

[9] *ibid.*, p. 26.

One of the reasons it works is that it is a day dream common to all of us. Breathes there a person who does not identify with Walter Mitty?

Wasn't George Plimpton taking a thrilling step for himself—and a comforting step for the rest of us—when, in his role of average man, he played with the football team and conducted the orchestra? "People think I'm an average Joe, but really I can_____." (Fill in the blank as you will.)

How many of us, when looking in the mirror, love to see a double image; first, Clark Kent, Mild-Mannered Reporter for a Major Metropolitan Newspaper and second, silhouetted behind him, faster than a speeding bullet, more powerful than a locomotive, able to leap tall buildings at a single bound, synthesis of dreams come true—Superman.

In all these stories and poems, the small or unassuming triumphs over seemingly overwhelming forces, sometimes because of secret powers, sometimes because right makes might, and sometimes because brain is more important than brawn.

The story of David and Goliath is one perfect example. So is Puss in Boots in which the seemingly worthless cat brings wealth and the hand of the Princess to his master. In Steig's *The Bad Island*, one little flower conquers all. And, in *The Brave Cowboy*, by Joan W. Anglund, the small boy wearing a cowboy hat, playing near his front door, is in fact intrepid explorer, successful hunter of vicious beasts and champion of the right, through relentless war against outlaws.

Children need these fantasies in order to feel some sense of control in their lives. If they can be strong and big, they can lead their lives by decision not by default; if they are always small, and their parents, the world (and siblings) are always big, they cannot. Passivity is the product of ineffectiveness (and, of course, this perpetuates itself) but growing up is an aggressive activity. Children need to be able to try on the mantle of power without being mocked. This kind of story provides such an opportunity, and provides it without the risk of guilt, a stiff price to pay for pretending.

Now you know the trick—it is finding what Henry James called the figure in the carpet.

As recognition in language (the casting of the linguistic shadow) is prerequisite to real reading, so recognition of a literary theme adds both familiarity and extra dimension to enjoyment of the printed word.

I once attended a concert of brasses in which the musicians talked about melody and various musical forms: waltzes, marches, scherzos, to name a few. Then they played Jingle Bells in each one. You should hear it as a chorale—it brings tears to the eyes! We, adults and children together,

learned to discover the pattern as well as recognize the melody. The same thing can be done with literature.

The categories and titles included here are not meant to be encompassing, merely encouraging. You will find others you prefer, or that you want to add. The main thing is to recognize the groundless snobbery and discomfort many people bring to their perception of children's books, and to see the common qualities they share with adult books—"chapter books"—when both are well written.

Pick the kind of book you enjoy reading and find it on a level appropriate to the child, or children, you want to read with. Do not be afraid of forcing your taste on them. Enthusiasm is contagious. At best you will introduce the child to something you enjoy at a level satisfying to him. Chances are this alone will produce a life-long convert. You are, in effect, taking him on a trip to a country always accessible to re-exploration. At the least, the child will enjoy your willingness, physical closeness and attention as you sit together and share language. Let him catch it from you.

Learning is aggressive. Reading comprehension is aggressive. The passive child may obediently learn to decode, but won't fall over the edge. He needs language and anticipation to invest himself in what he's reading. It must be worth his while. Back to *limerence*. As a word, it stuck in my mind right away because it had two associations for me: first, it reminded me of *limerick*, and thus humor; and second of *luminous*, and thus illumination and the light of understanding. What greater contributions can a teacher make to a child's life than humor and light?

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Comprehension, Recall, and Dyslexia: A Proposal for the Application of Schema Theory

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ABSTRACT

Evidence suggesting that dyslexia is a multifaceted syndrome is beginning to accumulate. Furthermore, a reexamination of some literature suggests that in addition to having word recognition problems, some dyslexics may also have problems understanding language. Whereas there is a rather extensive literature on word recognition, and even on word understanding, few studies have examined the problems dyslexics may have in understanding and remembering connected discourse. This paper explores issues related to certain possible problems of comprehension and recall among dyslexics and proposes a new direction for research through the application of schema theory.

> *. . . in the case of the reading disabilities . . . the ability to understand individual words often far outruns the capacity to grasp the meaning of equally simple words when combined into sentences, particularly if the sentence be long or if the form of its presentation be somewhat unusual. The rate of intake of meanings is slow, as shown by the much better ability to understand if the speech delivery be deliberate and the words carefully enunciated. Often one simple command will be carried out promptly and correctly, while if a series of equally simple tasks be requested only one will be attempted and even that may end in failure.*
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> —Samuel Torrey Orton, 1937

A major purpose of this paper is to offer support for the suggestion that in addition to problems of word recognition, some dyslexics have fundamen-

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tal problems in understanding or remembering information contained in connected discourse. A second purpose is to re-examine some of the literature on children with dyslexia, or severe reading disabilities, in light of recent theoretical and experimental developments (i.e., schema theory) in cognitive psychology and artificial intelligence. A third purpose is to suggest that the application of schema theory to the study of language comprehension and recall in dyslexic children may lead to a better understanding of the nature of their problems.

To accomplish these purposes, I first discuss selected literature on dyslexia. I hope to show that problems of some dyslexics may be grounded in faulty understanding or memory of higher order language structures and that more and different research on language comprehension and recall is needed to explore this possibility. In the second section I present a brief discussion of schema theory and of some research that has implications for the study of dyslexia. Finally, I present preliminary findings and speculations from my own research on story comprehension and recall as an illustration of how the study of dyslexia may benefit by incorporating a schema theoretic approach.

My attempt at accomplishing these purposes should be viewed in light of the following caveats. Because some of the issues and topics I discuss are very new, my remarks focus more on suggestions for work that needs to be done than on research that has already been conducted. My intention is to provoke thought, discussion, and research; for this reason, I do not present complete reviews of research on either language comprehension in dyslexics or schema theory and comprehension. Instead, I briefly review only those studies that support my predictions. Furthermore, for the most part I do not present methodological criticisms of the studies that I mention. Reviews of this nature are readily available (e.g., Roit 1977; Satz and Sparrow, 1970; Vellutino 1977, 1978). Instead, I use what literature there is to illustrate points that I make. Finally, I do not expect the research I propose to be able to pinpoint the loci of the difficulties that dyslexics experience. I do, however, expect it to suggest a domain within which some problems of some dyslexics may be located and more precisely understood in the future.

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Before proceeding, it is important that I make a general comment and related methodological criticism. It pertains to the definition of the term *dyslexia* and to the use of it and related terms in my paper and in the studies I discuss. The definition of dyslexia I adopt is derived by combining Critchley's (1968) often cited one and a more recent one by Wittrock (1978).[1] Accordingly, I use *dyslexia* as a generic term referring to a wide range of reading disabilities that includes reading difficulty in individuals who are apparently physically, intellectually, and emotionally normal and who have received normal reading instruction. (I use the terms *dyslexia*, *severe reading disability*, *reading disability*, and *learning difficulty* interchangeably in this paper.) Unfortunately, the authors of studies I discuss do not always include definitions of the labels they use to describe their subject samples; some do not describe carefully (or describe at all) the criteria by which their samples were selected; and many appear not to control for IQ differences between normal and dyslexic groups. Because of these shortcomings, it is often impossible to know precisely who is being studied, how severe their reading difficulties are, and whether intellectual or cognitive deficiencies are contributing to their reading problems. Despite these shortcomings, however, I think it is possible and important to use the existing research as a guide to better research in the future.

Research on Language Problems in Dyslexics

A Needed Shift in Focus

Major efforts in research on dyslexia and in instruction aimed at remediating the problems of dyslexics have focused on problems of word recognition and their underlying perceptual causes. Vellutino (1977, 1978) recently outlined several explanations for reading disability that have been predominant in the research. They are deficiencies or dysfunctions in visual processing (e.g., Bender 1958; Orton 1937), intersensory integration (e.g., Birch 1962; Birch and Belmont 1964), temporal order perception (Bakker 1970; Groenendaal and Bakker 1971), and verbal processing (Shankweiler

[1]Critchley (1968) defined dyslexia as "a difficulty in learning to read, which is constitutional, often genetically determined, and which is unassociated with general intellectual retardation, primary emotional instability, or gross physical defects" (p. 671). Wittrock's (1978) definition is: "Dyslexia, a generic term encompassing a myriad of reading disabilities, refers to reading difficulty in apparently normal individuals given standard reading instruction" (p. 94).

and Liberman 1972; Vellutino, Steger, and Kandel 1972). Vellutino discussed each rival hypothesis and argued that although the visual deficit hypothesis has been the predominant theme in dyslexia literature since the end of the nineteenth century, the verbal deficit hypothesis is the more plausible explanation for the problems dyslexics manifest.

According to Vellutino (1977), deficiencies in visual processing, intersensory integration, and temporal order perception can be explained by verbal processing deficiencies, or "dysfunctions in one or more aspects of linguistic functioning" (p. 343). He suggested that semantic, syntactic, and phonological aspects of language are likely sources of reading difficulty. For example, he cited research suggesting that poor readers are less accurate and slower than good readers at naming common objects, colors, letters, words, and so on (Denckla and Rudel 1976a, 1976b); and he posited that poor readers are insensitive to the internal structure of words, and their insensitivity may impair their ability to acquire knowledge of the alphabetic code (Shankweiler and Liberman 1972). But Vellutino implicated semantic, syntactic (this less so), and phonological components of language as sources of difficulty primarily in the word recognition aspect of reading. He did not suggest, except incidentally and indirectly, that dyslexics may have problems that impair their comprehension and memory of units of discourse that are larger than single words or sentences. I think investigation of this possibility will be critical to our understanding of dyslexia.

There is a good deal of evidence that a shift away from word recognition to focusing on language comprehension and memory is taking place in general experimental and educational research and practice. For example, the National Institute of Education has mounted a large research program (i.e., the Center for the Study of Reading) to study processes and problems of comprehension in the middle grades (fourth to eighth). Furthermore, a scanning of the tables of contents of major research journals shows a large increase in the number of articles that are related to issues of language comprehension. And by far the most frequent question raised by elementary classroom teachers and reading specialists is, "Now that we know what to do about decoding, what can we do to improve comprehension skills?" (Weaver, Willis, and Shonkoff 1977).

Are There No Comprehension Problems? Although the shift in focus to comprehension and memory of text is taking place in general, one can barely detect such stirrings in research and practice in the area of dyslexia. Why has it taken so long for attention to shift from perceptual and word recognition aspects of reading problems to language comprehension as-

pects? Perhaps it has been assumed that whatever reading comprehension deficits there might be, they are either the result of inadequate word recognition skills or secondary in importance to word recognition problems. Given these assumptions, the lack of a shift can be readily understood. In the first case, the view is that once word recognition skills are mastered, already-developed language skills will be able to operate on recognized words to produce understanding (Liberman and Shankweiler, in press; Mattingly 1972); therefore, there is no need to change the focus of research or instruction. In the second case, the view is that if students cannot recognize the words, then they cannot possibly understand them; therefore, mastering word recognition skills must be the first goal of instruction, and understanding word recognition processes must be the first goal of research (Perfetti and Lesgold, in press). The view guiding this paper, however, is that problems of word recognition are so prominent that they mask any difficulties there may be in comprehension and memory. Word recognition difficulties must be remediated,[2] but additional research is needed to determine whether and what kind of comprehension difficulties are associated with dyslexia and whether and what kind of special instruction in comprehension is needed.

Support for the two "no language comprehension problems" views seems to be drawn from the same bodies of literature. One source are studies of the importance of automatic word recognition to skilled reading. These indicate, in general, that students with automated word skills tend to be good comprehenders and that students who are slow, or inaccurate and slow, at word recognition tend to be poor comprehenders (LaBerge and Samuels 1974; Perfetti and Hogaboam 1975; Perfetti and Lesgold, in press; Shankweiler and Liberman 1972). It has not been demonstrated, however, whether improving word recognition skills or making them automatic necessarily improves comprehension. In fact, several researchers have suggested that improved comprehension does not result merely from skilled word recognition (Gibson and Levin 1975).

Another source of support comes from studies of spontaneous speech indicating that young dyslexic and young normal children's patterns of spoken discourse appear to be the same (e.g., Denckla and Rudel 1976a;

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[2]Bateman (in press) contends that we (researchers) already know enough about decoding to teach every child, even those with severe reading disabilities, to recognize words. She argues that the problems lie in teachers who do not know about, or know about and do not use, the best methods that are available. Bateman urges that we think in terms of *teaching* disabilities rather than *learning* disabilities.

Doehring 1968; Rosenthal 1970; and discussed by Vellutino 1978). Drawing conclusions from this type of research is problematic, however. Most individuals comprehend more than they produce and do not use advanced or sophisticated language structures in ordinary conversational situations. Therefore, nonuse does not necessarily mean that individuals (normal or dyslexic) do not possess or comprehend these structures, and comparisons of natural speech samples may not reveal higher order language differences.[3]

Comprehension Problems in Dyslexics

The shift in emphasis from word recognition to comprehension and memory has barely begun in the study of dyslexia, and I think it should be encouraged. There is a very small body of literature on story comprehension research that suggests directly, and some literature on sentence comprehension that suggests indirectly, that dyslexics may suffer from an inability to use structural information in constructing meaning from large units of discourse.

Indirect Evidence. The indirect evidence comes from comparisons of normal and disabled readers' understanding and use of syntactic information in sentences. In making such comparisons, some researchers have concluded that syntactic skills are not a source of difficulty for the reading-disabled; but their interpretations of their data are questionable. For example, Weber (1970) found that oral reading errors of both good and poor readers do not violate the grammatical structure of the sentence preceding the error. However, she also found that if errors violate the subsequent context, then good readers correct them much more often than poor readers do. From these data, Weber surprisingly concluded that good and poor readers are not different in their ability to use the grammatical structure of sentences to aid the identification of individual words.

Neville and Pugh (1976–1977) drew similar conclusions from analyses of errors made on cloze passages. Using a "context before/context after" error analysis technique, the authors found that compared to poor readers, good ones made fewer errors that conformed only to preceding context and more that conformed to the whole sentence. Despite these findings, Neville and Pugh concluded, as did Weber (1970), that poor readers are as sensitive

[3]There are studies which suggest that for some students dyslexia is preceded by delayed speech development or accompanied by speech difficulties (Ingram and Reid 1956; Mason 1968; Orton 1937; Rawson 1968).

to syntactic constraints (less so to semantic) as are good readers. Contrary to the conclusions drawn in the Weber and Neville and Pugh studies, the data suggest that there are important differences between good and poor readers' use of syntactic information.

Also, there is an emerging literature suggestive of syntactic difficulties in some dyslexic children. Reviews by Roit (1977) and Vellutino (1977, 1978) cited a number of studies that found syntactic differences between normal and dyslexic groups of students (e.g., Fry, Johnson, and Muehl 1970; Vogel 1974, 1975; Weaver 1978; Wiig and Semel 1975). Vogel (1975) studied oral syntax of normal and dyslexic children and tested an assumption that syntactic ability is positively related to reading comprehension. She found that dyslexics were significantly inferior to normals in three of the five aspects of syntax that she tested: recognition of melody pattern, sentence repetition, and syntax and morphology in expressive language. Furthermore, Vogel found that for her second-grade children, syntactic ability and reading comprehension were positively related.

Wiig and Semel (1975) tested productive language abilities in normal and reading-disabled adolescents and found the disabled group to be significantly different and less proficient in that they produced shorter phrases and sentences and used less sophisticated sentence structures, atypical patterns of intonation, and an excess of low-information words (pronouns and indefinite words such as *somewhere, something*). Fry, Johnson, and Muehl's (1970) discussion and review of Fry (1967) and Schulte (1967) reveal similar differences between second-grade poor and normal readers. Poor students were found to use less mature syntactic structures in telling a story from pictures.

In addition to these more traditional and direct measures of syntactic ability, several researchers found that disabled readers (and those at "high risk for reading failure") are unable to use structural information in sentences to aid comprehension and memory. For example, Denner (1970) found that although poor readers in first, third, fourth, and fifth grades and potentially poor readers in Headstart classes were able to demonstrate comprehension of separate logographic symbols (a single graphic symbol for each word), they were unable to synthesize the individual meanings and carry out the actions implied by logographic sentences. Denner interpreted the results as evidence of a global syntactic deficiency in the poor and potentially poor readers in his study.

Weinstein and Rabinovitch (1971), also investigated the relation between use of grammatical structure and reading ability. Good and poor fourth-grade readers were asked to recall sentences in which roots of

content words had been replaced by nonsense stems. They listened to two types of nonsense sentences, syntactically structured and syntactically unstructured. Good readers learned structured sentences in fewer trials than the unstructured materials; poor readers showed no differences in learning the structured and unstructured materials. From these results, the authors suggested that the difference between the two groups lies in their ability to use information inherent in the grammatical structure of a sentence.

To summarize, the literature comparing syntactic skills in normal and disabled or poor readers strongly suggests that there are important differences between these groups and that the deficiencies in disabled readers are related to difficulties in comprehension and recall. Therefore, it seems reasonable to suspect that some dyslexics are unable to understand or use structural information in sentences. This deficiency has been investigated at the sentence level, and my concern here is with structural deficiencies in processing larger units of text such as stories. It is, of course, impossible to extrapolate with any certainty from sentences to stories, but such studies offer provocative suggestions of a general structural deficiency.

Direct Evidence. There is a very small body of literature suggesting that disabled readers are deficient in their ability to use structural information in telling and remembering stories and in judging the relative importance of components of stories (de Hirsch, Jansky, and Langford 1966; Fry, Johnson, and Muehl 1970; Smiley, Oakley, Worthen, Campione, and Brown 1977). I discuss these studies in some detail and then relate them to schema theory and comprehension and recall.

As part of the development of a predictive battery of expressive language tests, de Hirsch, Jansky, and Langford (1966) included a longitudinal measure of story organization ability. The participating children were asked to tell the story of *The Three Bears*. Their protocols were judged on the basis of the extent to which they reconstructed the major points of the story and provided relevant details. The authors suggested that children must have relatively sophisticated language organizational abilities to be able to retell events of a story in a cohesive and sequentially plausible manner. Their findings indicated that the number of words used in the story telling was the best kindergarten expressive language predictor of end-of-second-grade reading achievement. Another statistically significant kindergarten predictor of later achievement was the ability to organize and integrate details of the story into a meaningful whole.

Included in de Hirsch et al.'s study were clinical descriptions of second-grade failing readers, "slow starters" (failing at reading in first

grade but on grade level at the end of second grade), older children (11 to 15 years old) with reading difficulties, and second-grade superior achievers. The findings for each of these groups that are related to story organization are summarized below.

1. Failing readers: This group had subtle language comprehension deficiencies demonstrated by "their inability to grasp the essential parts of a story and to place them in proper relation to the whole." The stories of five students were "relatively primitive, lacking in cohesiveness, and poorly integrated" (p. 48).

2. Slow starters: This group did fairly well on less complex tasks such as auditory perception and figure-ground discrimination. They, like the failing readers, did poorly in kindergarten on story integration, but their stories were somewhat less impoverished and fragmentary than the failing readers.

3. Older poor readers: Most of the students in this group were unable to tell a coherent story.

4. Superior achievers: This group displayed advanced linguistic ability. For example, compared to other groups, the superior achievers used the most complex sentence structures in their story telling.

In general, de Hirsch et al. concluded that story telling by the three groups of poor readers was inferior to that of the superior achievers and that students who are poor readers from the start may not for a long time or ever catch up with normal readers.

The reporting of findings in the de Hirsch et al. study is somewhat vague, and their scoring criteria are imprecise; so it is difficult to know just what they mean when they say that poor readers' story telling is inferior. Furthermore, the authors do not mention any control for degree of familiarity with the story, and differences in this variable may well contribute to group differences. This problem is mitigated somewhat, however, since the children were largely homogeneous with respect to socioeconomic status (lower middle class), and probably would be on the average equally familiar or unfamiliar with the story. Despite these shortcomings, it appears from the test data and the clinical descriptions that poor readers and potentially poor readers are in some ways different and deficient in their ability to organize, integrate, and recall higher level information.

Fry, Johnson, and Muehl (1970) investigated the relations between oral language production and reading skill.[4] Second-grade below average and

[4]In sharp contrast to de Hirsch et al., the methods of analyzing the protocols and the data gleaned from them are described in detail by Fry et al. and in even greater detail by Fry (1967) and Schulte (1967). Discussion of the procedures is beyond the scope of this paper, but they appear to be very carefully thought and carried out.

average and above average readers (equated on IQ and social class) were asked to tell a story about each of 20 pictures. Their findings, according to the authors, support three tentative conclusions:

1. The below average readers had smaller speaking vocabularies and were generally less verbally fluent than average and above average readers.

2. Below average readers tended to use more modification in the subject position, and average and above average readers used more in the predicate position. The former is suggested by the authors to be linguistically less sophisticated.

3. Below average readers produced more "existence type" sentences than the better readers. That is, they produced a series of sentences that described aspects of the pictures, but they did not integrate the information into a cohesive story. Better readers more often told meaningful stories and had the characters interact using conversation.

More recently, Smiley, Oakley, Worthen, Campione, and Brown (1977) compared good and poor seventh-grade readers' recall of "thematically relevant material" from stories, one presented orally and one presented in written form. (This study is different from the previous two in that in this study students wrote rather than told their story recalls.) Thematically important information is recalled more frequently than that which is less important (Brown and Smiley 1977), and the authors assumed that this sensitivity to importance is a prerequisite for comprehension. College students identified information units in each story. A unit was one that contained an idea and/or represented a place where a reader might pause. The students then classified the units into four levels according to relative importance. The information recalled by each seventh-grade reader was also classified and analyzed in terms of how much was recalled at each of these four levels of importance.

The findings of this study indicate, as expected, that poor readers comprehend and remember less than good readers. Furthermore, poor readers are sensitive to fewer gradations of structural importance in story content. Good readers recalled more Level 4 (most important) material than Level 3, and more Level 3 than Levels 2 or 1. Their recall of Level 2 and Level 1 material was the same. In contrast, although poor readers recalled more material from Level 4 than from any other level, their recall of material from the other three levels was undifferentiated.

These differences in sensitivity were as striking in the listening condition as they were in the reading condition—a finding that suggests a general comprehension deficiency in some poor readers, rather than one brought on by faulty word recognition. It could be, and it has been suggested, that comprehension deficiencies are a cumulative effect of years

of reading difficulty. However, this suggestion is challenged by Fry et al.'s finding that deficiencies are present in second graders, who cannot have had more than two or three years of reading difficulty.

From the findings of de Hirsch et al. (1966) and Fry et al. (1970), it appears that good and poor readers differ in their ability to organize information in story recalls. From the results of Smiley et al. (1977), it seems that poor readers are insensitive to the relative differences in importance of various units in stories. Taken together, these studies suggest that disabled readers are less able to organize and recall information in stories and that these deficiencies are related to and predictive of comprehension.

These findings are powerful. Why then has there been so little attention to these higher level abilities, and why has there been so little research in this area? In addition to the masking phenomenon of word recognition problems mentioned above, I think there is a methodological explanation. In 1940, Gates reported that kindergartners' ability to grasp the content and structure of a story was among the best predictors of later reading achievement. He did not include a test of these abilities in his predictive battery because the only method available at that time for obtaining such information was a subjective judgement by an examiner (Gates 1940). Recent theoretical and methodological advances in psychology, linguistics, and artificial intelligence have made it possible to analyze more precisely story comprehension and recall information, and studies such as Fry et al.'s (1970) and Smiley et al.'s (1977) are likely to be among the first of many of their kind. I present an overview of some of these advances in the following section.

Schema Theory and Story Comprehension and Recall

Some previous accounts or descriptions of language comprehension and acquisition of knowledge from written and spoken text assumed that the words, sentences, and passages themselves carry the meaning of the message; that is, it was assumed that readers or listeners simply decode the message. Phrases such as *getting the meaning from the text* or *extracting the intended meaning* are characteristic of such accounts. Rather simply stated, schema-theorists make the quite different assumption that the text alone does not carry meaning; instead, as Adams and Collins (in press) have suggested, the text merely provides guidelines for constructing the intended meaning. According to such an account, readers or listeners *bring* meaning

to the text (as well as get meaning from it), and they do so on the basis of their previous knowledge of the world.

As individuals hear or read discourse, their knowledge influences their expectations about the content and how it should be interpreted. At the same time, their knowledge is altered by the substance of the message. Schema theory is an attempt to describe this interaction between the text and the reader-listener—to specify how the reader-listener's knowledge is used to construct and interpret the information gotten from the text and to specify the form of that information (Adams and Collins, in press).

In his pioneering work on memory, Bartlett (1932) posited that information is encoded in and retrieved from memory with the aid of mental schemata. Schemata were and are thought to be skeletal structures of sorts, consisting of invariant aspects of the concepts or classes of concepts that are stored in memory. These structures, according to Ausubel (1963) and Anderson, Spiro, and Anderson (1977), provide the "ideational scaffolding" for anchoring new information during reading or listening; as information is taken in, the appropriate schema is activated and is "filled in" with the information. In the current literature, terms such as *frames* (Charniak 1975; Minsky 1975), *scripts* (Schank and Abelson 1975; Lehnert 1977), and *macrostructures* (Bower 1976; van Dijk 1973; Kintsch 1977), as well as *schemata* (Adams and Collins, in press; Bobrow and Norman 1975; Neisser 1967; Rumelhart 1975), are used to refer to the structures. Anderson, Spiro, and Anderson (1977) stated that "to interpret a particular situation in terms of a schema is to match the elements in the situation with the generic characterizations in the schematic knowledge structure" (p. 3). Another way of saying this is that "schemata contain *slots* or placeholders that can be *instantiated* with certain particular cases" (Anderson, Pichert, Goetz, Shallert, Stevens, and Trollip 1976, p. 3).

The application of schema theory to the study of story comprehension may help to explain more precisely the way stories are comprehended and remembered. Specifically, it may help to explain: (1) readers' or listeners' ability to predict upcoming events in stories and their sequence of occurrence; (2) what enables readers or listeners to go beyond what is stated and make elaborate and plausible inferences that enrich meaning; (3) how readers can often reconstruct the interrelations among concepts and events as they were envisioned by the writer; and most importantly, (4) what is involved in reading or listening failure.

According to schema theorists, stories have an internal structure analogous to that of sentences. The elements of each story are interrelated

in ways that can be described by a set of grammatical rules.[5] Thus, for example, stories have a setting that usually introduces characters and describes location and time. The character usually has some sort of problem, some event is initiated in an effort to solve the problem, and eventually there is a resolution. Whereas simple stories may have only one problem besetting the main character that is resolved with a simple action, most stories are more complex, with several characters, problems, and interrelated courses of action that eventually lead to resolutions.

Story grammars delineate a set of rules for describing the interrelations among elements common to stories. The fact that stories have a similar general structure allows the reader who is familiar with various kinds of stories (e.g., fairy tales, mysteries, fables) to generate expectations about the way elements in a given story are causally or temporally related. Schema theorists suggest that people use this type of information (i.e., schemata for stories) as a guide to comprehending stories and as an aid for recalling story information (Mandler and Johnson 1977).

In addition to the theoretical literature on story schemata and story grammars, there is a small but growing and promising body of research on the development of story comprehension and recall. The research indicates that although very young children are sensitive to structural properties of stories, there are developmental differences. As one would expect, virtually every study has found that older students and adults recall more than younger ones, and some specify the factors that underlie these age-related changes in recall. For example, younger children are less able to organize information they recall and are less able to compensate for variation in or distortions of story structure (Stein and Glenn 1977). In addition, younger children are less able to use order information (Brown 1975, 1976) and are less apt to make plausible embellishments when retelling a story (Brown and Smiley 1977). Furthermore, younger children are less prone to generate inferences that are needed to understand more than the literal meaning of the text or discourse (Paris and Lindauer 1976; Paris and Upton 1976), and they are less able to distinguish between more and less important elements of a story (Brown and Smiley 1977).

Although we are beginning to understand the nature of age-related differences in discourse comprehension, we know almost nothing about the

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[5]A number of story grammars have been proposed (e.g., Mandler and Johnson 1977; Rumelhart 1975; Stein and Glenn, in press; Thorndyke 1977). The description here is not complete and not true to any one grammar. Instead, it is a schematic description of the set of recently developed story grammars.

ways poor readers use (or do not use) structural information to aid comprehension and recall. It is possible that poor readers simply have not developed the requisite skills and schemata. If this were the case, then it would be reasonable to expect that their performance would resemble that of younger normal readers. There is some evidence consistent with this hypothesis. In a study comparing good and poor seventh-grade readers, Smiley et al. (1977) found that the poor readers' patterns of recall were much like those of first-graders in that they were very poor at distinguishing the more important elements of a story from those that are less important. An alternative hypothesis is that poor readers have developed inappropriate strategies and schemata. It is important to learn how good readers use their schematic information to make sense of text and to determine how poor readers differ: Are they merely behind, and thus similar in some respects to young normal readers, or do they exhibit strategies and recall patterns that suggest fundamental differences in information processing? Answers to these questions are especially important for understanding the nature of dyslexia.

Story Comprehension of Dyslexic Students

I and David Dickinson, a doctoral candidate in Human Development, with the assistance of Valarie French and Leslie Desmond, students in Reading, are currently conducting research to explore some of these questions. Our first study is not yet completed, and the data that we have collected have not been formally analyzed, but I want to report the general methodology and share preliminary speculations from an "eyeball" analysis of some of our data. I hope this speculative discussion illustrates the kind of questions that can be asked and answered by applying schema theory to the study of language comprehension and recall in dyslexic children.

We are collecting story recalls from about 25 students who attend a suburban private school for students with learning difficulties. We are using the four stories and some of the procedures that Stein and Glenn (in press) used because the stories have already been parsed and used to study development of story comprehension in normally achieving first and fifth graders. Therefore, developmental data are available against which to make general comparisons between normal and dyslexic students.

We are testing one group of students that is from 9 to 11 years old and another that is from 13 to 15 years old. Our intention is to compare our older

and younger groups to Stein and Glenn's older and younger groups, respectively. The students in our study first listen to an experimenter tell two stories, then they are given a masking task where they count either forward to fifty (the younger students) or backward by ones or twos from fifty (the older students), and then they are asked to retell the stories just as they heard them. This procedure is repeated for a second pair of stories. The order of presentation of the two pairs is roughly counterbalanced across students to account for possible order effects. After all four stories have been told and recalled, a set of probe questions about each story is asked. The entire procedure is tape recorded, and the protocols are transcribed. We chose to tell the stories rather than have the students read them because we will get a measure of comprehension that is not contaminated by word recognition difficulties. This choice does not imply that we believe the processes involved in reading and listening comprehension are the same. Instead, we think it is the better methodological compromise.

The four stories are the folktale "Epanimondas" and three other stories that Stein and Glenn reported having adapted from existing children's literature. (Stein and Glenn did not report readability levels. We calculated them using the Spache Readability Formula, and they ranged from grade 2.3 to 3.3, with an average of 2.75.) All statements in each story were parsed into the categories specified by Stein and Glenn's (in press) grammar. The seven categories specified in the grammar are: major setting, minor setting, initiating events, internal responses, attempts, direct consequences, and reactions. The *major setting* includes the character introduction, and the *minor setting* includes description of the story content. *Initiating events* are those that begin an episode; they influence the characters' plans and actions. *Internal responses* are the plans, goals, and cognitions of the character(s). *Attempts* include the character's overt actions to obtain a goal; *direct consequences* express whether or not the goal is attained; and *reactions* include affective responses, cognitions, and actions.

Developmental Data

It is beyond the scope of this discussion to report in detail Stein and Glenn's (in press) findings. However, a general summary of some results should illustrate the kind of information that can be acquired from comprehension and memory research that is based on schema theory and uses a story grammar approach.

In general, Stein and Glenn did not find striking developmental differences, except in the amount of information recalled. Fifth graders

recalled significantly more statements from each story and significantly more internal response statements than did first graders. There were some other specific differences. Some of the first graders had difficulty remembering the main character. They confused the actions of one character with those of another or substituted one kind of animal (character) for another. Furthermore, fifth graders included significantly more new information (i.e., inferences) in their recalls than did first graders, and these were most frequently internal responses and attempts. This is noteworthy because these categories also tended to be among the less well remembered by both first and fifth graders. Stein and Glenn interpreted this to mean that children at both age levels are well aware of characters' feelings, thoughts, and goals, but they tend to have an understanding that is different from that given in the original version of the story.

The kind of information remembered from each story was similar for each grade level. For both first and fifth graders, the major setting category was the best remembered, and initiating events and direct consequences were the next best remembered categories. The attempt category was fourth in rank in three stories and fifth in rank in the fourth story. Internal response and minor setting categories were always in the last few positions. In addition to the similarity across grade levels in the categories of information recalled, the sequence of events in the recall protocols of both groups closely resembled that in the original version of the story.

Stein and Glenn's findings suggest that first graders have already developed a sensitivity to story structure. Their comprehension and recall appear to be quantitatively inferior to fifth graders'; but the fact that they generally recall (or not) the same kind of information suggests that they are qualitatively similar. (Such a finding could be due to the fact that the method of analysis was not sensitive enough to uncover other developmental differences.)

Speculations Based on Story Recall Protocols

The students' story recall protocols have been transcribed and are being scored. In the course of doing the scoring, we noted that Stein and Glenn's scoring scheme, designed to analyze recall in terms of the categories of their grammar, did not capture some of what appeared to be potentially important differences between normal and dyslexic students. Therefore, we are developing a scoring scheme that we hope will permit more sensitive analyses of information between and within grammar categories, as well as between and within sentences. To date, the kinds of information we are scoring include information recalled verbatim, informa-

tion omitted, plausible and implausible new information added, plausible and implausible changes of information that was presented in the original version of the story, and instances of changing narrative to dialogue. Although it is too early to discuss the results of applying our scoring scheme, I want to discuss tentative speculations that are based on an informal look at some of our protocols.

Age-related Speculations. We originally hypothesized that on the average, the older dyslexic students (13–15 years) would produce quantitatively and qualitatively superior recall protocols compared to those of the younger dyslexic students (9–11 years). It appears, however, that there are not clear-cut developmental differences. As a group, the older students are not better at recalling stories. Some older students are better than some younger ones, but there are also a number of younger students who produce more complete and accurate stories than some older ones. Even though there do not appear to be age-related differences within our sample, in general it seems that our dyslexics are quantitatively and qualitatively different from Stein and Glenn's normal students. Our older and younger students tended to produce less in their recall protocols than normal older and younger students did, respectively.

If age is not related to story comprehension and recall within the dyslexic sample, what might be? One obvious possibility is the degree of reading and other language related difficulties. We will, of course, carry out the analyses necessary to determine the direction and strength of the relationships between story comprehension and memory and various other language skills.

In addition we are investigating a verbal-performance discrepancy on the Weschler Intelligence Scale for Children (WISC) and its relation to story comprehension and recall. As Roit (1977) discussed, analyses of WISC profiles suggest a relationship between a verbal-performance discrepancy and reading disability, with lower verbal scores being associated with reading disability (e.g., Mattis, French, and Rapin 1975; Nelson and Warrington 1974; Warrington 1967). Our hypothesis is that the kind, amount, and organization of story information in recall will be related to WISC score profiles. At this time, however, it is difficult to make predictions regarding the nature of the relationship. For example, students with significantly lower verbal IQ scores may do poorly on story recall. They might simply recall less, or they might exhibit peculiar patterns in their recalls. It could also be that students who do poorly on WISC subtests that require sequential ordering (digit span, coding, picture arrangement) may

do the worst on the story task, regardless of their total verbal-performance IQ score relationship, because of the sequencing demands required in story recall. This would be the case if they did not have story schemata on which to anchor and retrieve information from specific stories, and thus did not have a framework for understanding and remembering causal and temporal relations. Once we have completed our analyses, we should be able to answer these questions.

Comprehension and Memory Problems. By comparing story recall protocols and responses to the questions asked following the stories, we should be able to separate problems of comprehension from those of memory. For example, if a student produces a fragmentary or impoverished protocol, it could be that the aspects of the story not included in retelling were understood but forgotten, not understood and forgotten, or not understood and intentionally excluded because they did not make sense.

At first glance, it seems that the students in our sample have greater understanding of the stories than they have unprompted memory for them. That is, in general they seem to be able to answer questions correctly about information that they did not produce in the free recall period. This does not imply necessarily that comprehension problems do not exist. These are fairly short and simple stories, and they may not reveal existing problems of comprehension at levels beyond the literal.

Even with this limitation there are some more specific comparisons between the free and probed recall protocols that, if supported by statistical analyses, may prove to be very interesting. For example, the more central a piece of information is to a story, the more likely it is to be included in the free recall. If such information is not mentioned or not clearly specified in the free recall, then responses to probe questions tend to reveal that the information was misunderstood or only partially understood. Furthermore, if information is not central to the plot of a story and if it is not mentioned in the free recall, then it is more likely not to be remembered during the questioning period. Thus, the students appear to have a sense of what is important or central to a story, and they know enough not to reproduce information that does not make sense in the context of the story. They also tend to forget, or never store in memory in the first place, information that is not centrally important. In other words, the students appear to be using some kind of schematic knowledge of stories to guide their retellings.

Quantity versus Quality of Information Recalled. When we first compared our students' protocols to those of Stein and Glenn's, we were struck by the brevity of our students' story retellings. Our first thought was that

they merely understood and remembered less. This may be the case. However, after a more careful look at several students' story retellings, we have additional notions. It seems that the students may be producing summaries of the stories rather than complete and detailed versions.

Bartlett in 1932 and others after him (e.g., Bower 1976; van Dijk 1975) have demonstrated that although detailed, nearly verbatim recalls are possible shortly after hearing or reading prose, as time passes, more and more details are forgotten; what is recalled is the gist of the discourse. The period of time over which memory and its decay is measured in such studies is typically days, weeks, or months. We measured memory in terms of minutes, and given that measure, it appears to take normal information processors days to forget what our students forget in minutes. It may be, however, that our students are aware of their memory problems, know what is and is not centrally important information, and knowing their own limitations, choose not even to try to remember the details of the stories. Of course these are merely speculations, and I am not sure whether our analyses will or even can support them. However, if this or future research reveals the conscious presence of such an adaptive strategy, then we will have demonstrated the tremendous resourcefulness of dyslexic students.

Conclusion

I think the results of our data analyses will yield valuable information and certainly advance our understanding of the nature of dyslexia. Of course there is a great deal of research to be done, and schema theory offers a promising context for it. Studies such as the ones we are conducting can reveal what dyslexics do and do not comprehend and recall and how they compare on these dimensions with younger, developmentally normal children. The findings will only begin to reveal why patterns of comprehension and recall exist and how to change them and adapt instruction to them. These issues are the critical issues, and they require the best of our science, experience, and intuitions.

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Reading Behavior in Dyslexia: Is There a Distinctive Pattern?

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Research on reading disability has produced rather little that is of use in diagnosis and treatment despite very considerable expenditures of individual effort and public money. The low yield of research on reading problems no doubt has a number of causes. A major one, in our view, is that the search for causes of reading disability has proceeded independently of investigation into the foundations for reading acquisition in the normal child. For the past several years, the reading research group at Haskins Laboratories has been asking questions about how learning to read builds upon the earlier speech acquisitions of the child. We think that we have made progress in understanding the relationships between reading and spoken language and that our findings throw some light on the causes of reading disability, including the special case of dyslexia.

A necessary condition for considering a child "dyslexic" is the existence of a significant disparity between the child's actual measured performance and the level of reading performance that might reasonably be expected in view of his intelligence and his educational opportunities. This would serve to distinguish the dyslexic child from the child whose educational attainments are uniformly low. But, of course, more has usually been implied in the use of the term. The designation "dyslexic" carries an implication about the causes of reading failure. It assumes a constitutional inadequacy that blocks the efficient acquisition of reading while not resulting in general intellectual retardation (Benton 1975).

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Perception of Letter Orientation and Letter Sequence in Dyslexia

Much effort has gone into the search for pathognomic signs of dyslexia, that is to say, qualitative features that distinguish a dyslexic child from one who is merely backward in reading. The tendency of young children to confuse letters of similar shape that differ in orientation (such as *b*, *d*, *p*, *q*) is well known. Reversal of the direction of letter sequences (such as reading *was* for *saw*) is another phenomenon that is frequently cited and usually considered to be intrinsically related to orientation reversal. Both types of reversals have been viewed as symptoms of a disturbance in the visual directional scan of print in children with reading disability. One early student of reading problems, S. T. Orton (1937), believed that reversals are of diagnostic significance in dyslexia; indeed, so convinced was he of their centrality that he invented the name "strephosymbolia" to designate the condition of specific childhood reading disability. Reversal phenomena, in Orton's view, are a manifestation of poorly established left cerebral hemisphere dominance for speech.

In view of the continuing influence of Orton's views and the persisting unanswered questions about the role of reversals in dyslexia, we were prompted to ask whether children diagnosed as dyslexic exhibit a distinctive pattern of misreadings and, in particular, to discover whether they reverse letters and words more frequently than other poor readers whose backwardness stems from diverse causes.

The pattern of errors in reading isolated words and nonsense syllables was studied in two groups of children, aged 8 to 10 years, all within the normal range of intelligence. One group (see Fischer, Liberman, and Shankweiler, in press) consisted of children diagnosed as "dyslexic" by the staff of the Kennedy Institute of the Johns Hopkins Hospital, Baltimore. The other group included all the children in the second year of a Connecticut elementary school who fell into the lowest third on a standard test of reading achievement (Liberman, Shankweiler, Orlando, Harris, and Bell-Berti, 1971). Although the dyslexic children were somewhat poorer in word recognition than the backward readers selected purely on psychometric grounds, the groups did not differ significantly in the incidence of reversal errors. When each error type was tabulated (Fig. 1) as a proportion of total opportunities for an error of that type to occur, it was seen that reversals of letter sequence (RS) occurred with an incidence of 8 percent among the Institute group and 6 percent among the school group. Similarly, reversals of letter orientation (RO) occurred with an incidence of 12 percent and 13

percent, respectively. Thus the groups appeared nearly alike in their tendency to make each type of reversal error. Moreover, for both groups, reversals represented only a small proportion of the total number of reading errors. Vowel errors and errors on nonreversible consonants provided the bulk of the misreadings for both the dyslexics and backward readers. The low incidence of reversal errors in both groups should raise questions regarding Orton's belief that reversals are the hallmark of dyslexia.

The performances of the dyslexic and school groups did differ, however, in regard to certain spatial characteristics of letter reversal errors. The dyslexics showed a 2:1 excess of horizontal over vertical letter transformations (for example, *b* was confused with *d* more often than with *p*). There was, moreover, an asymmetry in the direction of reversals; namely, there was a bias to read reversible letters from right to left (*b* going to *d* instead of *d* going to *b*). Neither of these features was characteristic of the school group of poor readers. For them, vertical reversals occurred as frequently as reversals in the horizontal plane and horizontal reversals did not show a directional bias. The absence of this directional bias in the errors made by the school group, together with its presence in the dyslexic group, suggests that reversible letters may present a special obstacle to some dyslexic children, lending a measure of support to Orton's claims. Further work is needed to discover whether children who show a consistent directional bias in their reversal errors can be distinguished in other ways from the larger group who do not.

On balance, however, we were more impressed by the similarities in the results for the two groups than by the differences. For both groups, more errors occurred on nonreversible consonants than on reversible ones, and vowels elicited the highest rate of error (see Figure 1). Errors on the final consonant of consonant-vowel-consonant syllables were about double those on the initial consonant, while errors on the medial vowel exceeded those on consonants in both initial and final position (Fischer et al., in press). In addition, the same error pattern occurred in reading nonsense syllables as in reading words, though, of course, the actual frequencies differed.

It appears that the common error pattern is determined largely by the phonetic and orthographic structure of words. One aspect of the common pattern, that vowels elicit more errors than consonants, is well documented in earlier work (Monroe 1932; Weber 1970; Shankweiler and Liberman 1972), and remains true when the position of the vowel is varied in the word. The difference in consonant and vowel error pattern suggested that they might have different causes. This idea was supported by the results of an

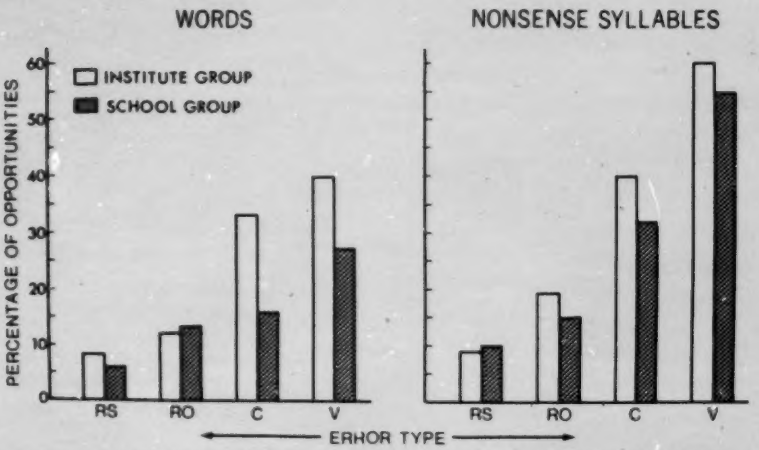

Figure 1. Errors in relation to opportunities by the Institute (dyslexic) group and the School (backward readers) group for monosyllabic words and nonsense syllables. RS = reversed sequence; RO = reversed letter orientation; C = other consonant error; V = vowel error.

analysis that took account of the phonetic relationships between consonants and vowels as written and the sounds substituted for them when misread.

If reading involves the conversion of the graphic shapes of print into a speech-based internal representation, then we might expect misreadings of a word to bear a systematic phonetic relationship to the target word. This expectation was clearly borne out in data on consonant errors that we obtained with a random selection of school children in grades 2, 3, and 4 (Fowler, Liberman, and Shankweiler 1977). Misreadings of consonants were tabulated according to the number of phonetic features shared between the phonological segments of the target word and the phonological segments of the word as read. Consonant substitutions were found to bear a close phonetic relationship to the target word, differing most often in only one of three phonetic feature values (voicing, place of production, manner of production). Vowel errors, in contrast, were not systematically related to the phonetic features of the vowel as written (tenseness, tongue advancement, tongue height, and diphthongization). Thus, the dimensional analysis, so successful in rationalizing the substitutions among the consonants, does not enable us to understand the vowel errors. Here, phonetic contributions to the error pattern are presumably obscured by some other more powerful source.

It is surely significant that the opposition between consonant and vowel, which occurs universally in speech, should be manifested in the pattern of reading errors. We suspect that the difference in error pattern of vowels and consonants is related to the different functional roles they have in English phonology. Vowels are the more fluid and variable of the two classes of phones, more subject to phonetic variation across dialect groups and more subject to phonetic drift over time. This relatively greater variability of vowels may account in part for their more complex representation in the spelling system of English, particularly for the fact that there tend to be many spellings for each vowel and more nearly one-to-one spelling-to-sound relationships for consonants. Either factor would account for the higher rate of misreading of vowels than consonants. At present we are attempting to discover, by cross language comparisons, whether the preponderance of vowel errors over consonant errors disappears in reading a language (Serbo-Croatian) in which the representation of the vowels is more nearly phonetic than is the case in the orthography of English.

At all events, it is clear to us that the pattern of reading errors in the beginning reader, whether dyslexic or not, has to be understood chiefly in linguistic terms, not in terms of the properties of letters as shapes. Taken as optical shapes, the set of letters representing consonants is not marked in any distinctive way from the set representing the vowels. Therefore, it is almost inconceivable that the differences between consonants and vowels in frequency of misreadings, in distribution of errors within the syllable, and in the nature of the errors could reflect misclassification based on visual characteristics.

Reading Disability and Language Deficits

Our research on language deficits and reading disability was carried out with school children who had been selected for backwardness in reading behavior. How many would have met the restrictive criteria for selection of the Institute Group is open to question. However, we believe that the approach we adopted has value for future studies of dyslexia, narrowly defined.

We have shown that poor readers frequently show subtle deficits in language development which manifest themselves not as clinically detectable gross difficulties in speaking and understanding, but instead as failures to achieve awareness of the phonetic structure of language so necessary for effective use of an alphabet (Liberman, Shankweiler, Fischer, and Carter

1974; Zifcak 1977). We have also found a language deficit of another kind to be characteristic of children who are backward in reading: they tend to show deficiencies in verbal recall and recognition in situations which require retention of the phonetic properties of words (Liberman, Shankweiler, Liberman, Fowler, and Fischer 1977; Shankweiler and Liberman 1976). This latter finding is not surprising when one considers the role of phonetic coding in reading.

It is well-known (Conrad 1964, 1972; Baddeley 1968) that when adult subjects are required to write down, immediately after presentation, a list of random letters, examination of the errors of recall shows a tendency to confuse items whose names sound alike rather than those whose shapes look alike. Strings of letters, such as PTBDG, all of which are rhymes, generate many more errors than those whose names do not rhyme, such as WLRZY. Selective interference due to rhyme suggests that the subjects tend to convert the visual symbols into internal speech at some time before recall, though there is no *a priori* reason why they should do this in preference to retaining the items as shapes.

We have investigated the recall of rhyming and nonrhyming strings of letters as a way of examining the possibility that children who read well may differ from those who read badly in the process by which they transform visual material into speech. We considered that given the task of serial recall of random strings of rhyming items, children who are good readers might be more apt to transform the stimuli into speech and might, therefore, be more susceptible to phonetic interference than backward readers. Three groups of school children aged 8 to 10 were the subjects in this study (Liberman et al. 1977). Roughly matched in IQ, they differed in level of reading attainment (as assessed by a standard test, the Wide Range Achievement Test). They may be designated as superior, mildly backward and severely backward. These subjects were shown strings of five consonant letters briefly exposed and were asked to write down each string in the order given. Letters in one-half of the strings rhymed; those in the other half did not.

The results, which are displayed in Figure 2, showed that rhyme had a strong penal effect on recall, but only in the case of the superior readers. In contrast, the performance of the two groups of backward readers was much less influenced by the phonetic characteristics of the items (that is, by whether or not the items rhymed). The most obvious possibility seemed to be that the backward readers, for whatever reason, were not as vigorous or as consistent as the good readers in converting the visual input into a phonetic representation. Thus, because they preferred to code the letters

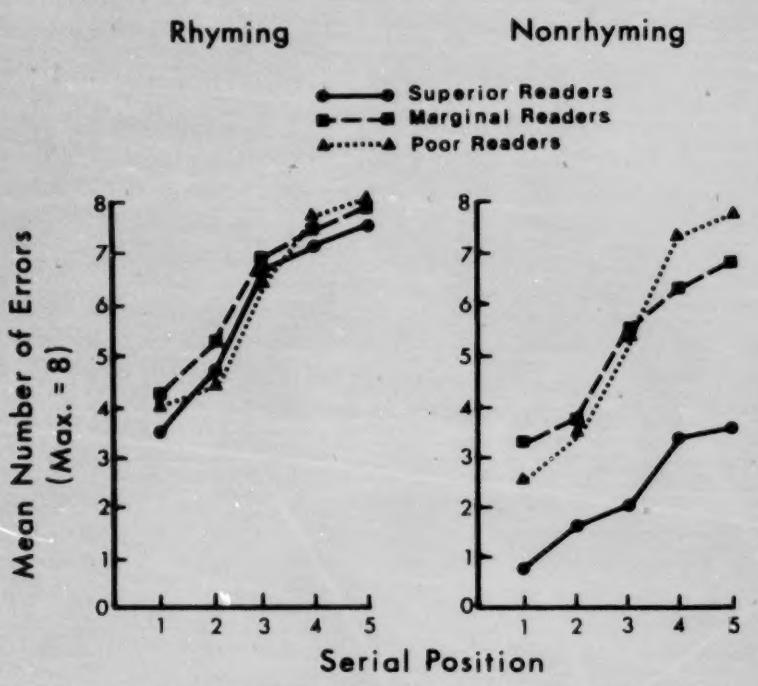

Figure 2. Errors in recall of rhyming and nonrhyming letter strings plotted by serial position for three groups of children who differed in reading achievement (from Liberman et al. 1977).

not as speech items but in another way (perhaps as visual shapes), their recall performance showed less susceptibility to phonetic interference.

Through a further experiment with the same groups of children (Shankweiler and Liberman 1976), we discovered that the differences we obtained in the performance of backward readers and good readers do not depend on visual presentation; the findings were essentially reproduced when the stimuli were presented by ear. To carry out an auditory serial recall experiment necessitated a further condition in the visual mode in which the letters in each group were presented successively one by one rather than as a simultaneous array. The two new conditions were thus precise analogues that differed only in modality. All three studies, the two with visual presentation and the one with auditory, gave strikingly similar results with regard to the question of interest. In each, the backward readers were relatively little influenced by the phonetic characteristics of

the items whereas the superior readers were greatly affected by that variable.

The new results forced us to revise our opinion about the nature of the problem the backward readers were having. No longer could we see the transformation of visual stimuli into a phonetic representation as the crux of the problem, since differences of the same order of magnitude occurred when the stimuli were spoken and presented to the ear. Apparently, the internal representation of the group of stimuli persists longer or is more accessible in the good reading subjects, regardless of whether stimulus presentation is to the eye or to the ear.

How, then, are we to regard the backward readers' difficulty? One might ask whether backward readers are generally impaired on all memory tasks, whatever their nature. In reply we can state that it has not been found that backward readers are consistently impaired on memory tasks, other than those involving linguistic material or others on which speech coding may readily occur (see Vellutino 1977 for a discussion of this question).

Another possibility we must consider is that the underlying difficulty of the backward readers is in recall of the temporal order of the elements of an auditory or visual pattern. Two facts weigh heavily against this interpretation. First, let us return to our experiment on recall of rhyming and nonrhyming letter strings. This was, of course, a serial recall task in that the subjects had to recall the left-right order or the temporal order of the items in making their responses. We (Shankweiler and Liberman 1976) rescored the subjects' responses, this time ignoring order and giving credit to any correct item regardless of the order in which it was written down. This procedural change did not significantly alter the differences among the groups with regard to the factor of phonetic confusability. Finally, we have evidence from an altogether new study (Mark, Shankweiler, Liberman, and Fowler 1977) that good readers are more adversely affected by rhyming items than backward readers in a recognition memory experiment that entirely avoids the requirement of ordered recall.

All of our findings on language deficits in poor readers support Bakker's (1972) claim that in tests of perception and retention of serial order information, the verbal or nonverbal nature of the task requirements is crucial. In our view, there is ample reason to suppose that phonetic coding processes and not merely length of memory span or temporal order perception must be taken into account in order to find the causes of reading backwardness. From that perspective, poor serial recall is a symptom of difficulties in phonetic coding, not an independent deficit.

Summary

Our findings do not support the belief that a subclass of those specifically backward in reading, the dyslexics, can be differentiated from other poor readers on the basis of a high rate of reversal errors. Although some dyslexics showed orientational and directional biases which are absent in most poor readers, neither those children classified as dyslexics nor other poor readers typically displayed a high proportion of reversals as compared with other errors. Moreover, the difficulties manifested in the common error pattern are chiefly outside the domain of visual perception. They are language-related and are not specific to the visual perception of language. The difficulties of poor readers appear to reflect the inaccessibility of the phonetic segmentation of spoken language, inability to adopt an efficient coding strategy for operations involving short-term memory, and failure to grasp the complex nature of the spelling system of English. Since the difficulties of learning to read interact with the structural peculiarities of particular languages and the way those structures are manifested in the writing system, we must suppose that important work remains to be done in cross-language comparisons of children's reading errors. How these linguistic factors may influence the reading behavior of dyslexics is likely to be a productive question for future investigation.

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Dyslexia and Sequential Order Errors in Reading

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Abstract

This paper reports a study of the antecedent-consequent model of reading dysfunction and possible relationships between verbal spatial order memory and sequence errors in word reading. It provides data on the nature and frequency of such errors. Performance by normal and dyslexic readers on a number of tasks was compared. The study supports the hypothesis that sequence errors of dyslexic readers are related to a developmental lag.

Introduction

The study reported in this paper was an attempt to validate an antecedent-consequent model of dysfunctional reading acquisition (Weiner and Cromer 1967) by demonstrating relationships between the cognitive factor of verbal sequential memory and word reading errors that involve sequence of letters in words. The study explored the frequency of normal and dyslexic readers' sequence errors on several types of anagrams.

The notion that antecedent factors and consequent linguistic behaviors can be linked, though rare in reading research, pervades the literature of neurolinguistics which relates locus of brain dysfunction to specific patterns of linguistic dysfunction. Bakker (1972), Boder (1972), Ingram (1971), Kinsbourne and Warrington (1966), and Pirrozolo (1977) have demonstrated or suggested relationships between aspects of brain functioning and particular reading and spelling error patterns.

Research from many sources implicates sequential ordering as a signigicant antecedent factor in dyslexia and reading disability (Corkin 1974; Doehring 1968). Bakker (1972) considered dyslexics to be character-

This research was carried out in partial fulfillment of the requirements for the Ed.D. at the University of Rochester. The author would like to express appreciation to Drs. Keith Rayner, Harry Reis, Ellsworth Woestehoff, Frank Greene and Achilles de Berardinis for their advice and assistance in the study.

ized by temporal order deficits in the verbal sphere. He found that dyslexics did not differ from normal readers in accuracy of recall, but did differ in sequential ordering ability involving figures that could be verbally labeled. Similar findings were reported by Mason, Katz, and Wicklund (1975). They developed a paradigm whereby item and order memory on similar tasks could be compared. Though good readers did better than poor readers on both tasks, only order memory correlated significantly with reading achievement. Mason et al. (1975) interpreted these data to be consistent with the notion that order memory is more strongly related to reading ability than is item memory.

Many investigators (Bakker 1972, Bennett 1942, and Orton 1937) have observed sequential misordering errors in word reading. Some consider them to be the "classic" dyslexic errors (Boder 1973; Critchley 1970). Their occurrence, however, among normal and poor readers and the effect of various anagrams on such errors had not been examined in a study involving control over word type, frequency, and opportunity for error.

The Study

Purpose

The validation of the antecedent-consequent model of reading dysfunction requires convincing evidence that the various symptoms are indeed related to their postulated antecedents. One antecedent condition that appears to be related to reading difficulty is spatial sequence memory. The twisting of sequences of letters in words is considered to be an important consequent. The analogy between sequence memory and order errors suggests that the first step in validating the model is to inquire whether some relationship between spatial sequence memory and sequential errors in word reading can be demonstrated. This study sought an answer to this question.

This relationship was examined in normal and dyslexic readers by asking them to perform tasks requiring verbal spatial sequential memory and the reading of several types of anagrams. The anagrams contained letter sequences that lent themselves to confusions in reading more readily than other letter sequences.

Subjects

Subjects for the study were 38 second grade, 58 third grade, and 46 fourth grade children selected from a suburban Rochester school system

which contained a wide range of income and educational levels, and intelligence and achievement scores comparable to national norms. Within each grade level, half of the subjects were classified as dyslexic readers and the other half as normal readers.

The dyslexic children were all those in the school district who met the following criteria: (1) score at or below the 28th percentile on the *Stanford Reading Achievement Test*, Primary I, II, or III, Form A (1973); (2) IQ at or above 90 or the *Lorge Thorndike*, Form I, Level A (1964), or equivalent raw score on the *Metropolitan Readiness Test*, Form A (1964); (3) absence of a neurological report of brain damage; (4) absence of an uncorrected sensory defect that might interfere with school learning as judged by the school nurse; (5) absence of referral to an outside agency for psychological therapy; (6) placement in a regular classroom without having been retained; (7) approval of the building principal; and (8) parental consent.

The normal children were matched to the dyslexic children by sex, grade, school, and age within three months. Reading scores of the normal children were between the 50th and 80th percentiles on the *Stanford Reading Achievement Test*. This test had been administered system-wide prior to the beginning of the study. Table I contains a summary description of the subjects.

Stimulus Materials

Item Memory Task. Stimuli were horizontal strings of four, six, and eight lower-case letters (Normatype, No. 27; Franklin Gothic, 48 pt.), centered on 4-by-6-inch index cards. Letters were randomly chosen, but repetitions and similarly shaped letters were eliminated from each string.

Order Memory Task. Stimuli were the same letter strings, which were used alternately for the Item and Order tasks. The order memory task also required 1.25 cm. square white wooden chips, printed on both sides with the same letter.

Word Reading Task. With the goal of systematically varying the opportunity to make sequence errors, three kinds of anagrams were used as stimuli. They were: (1) anagram pairs in which both words shared the same initial letter ("I" words); (2) pairs whose letters could be rearranged to form either word ("S" words), and (3) fully reversible words ("R" words). Rare words and pairs with widely discrepant frequencies, based on the Standard Frequency Index (SFI) of Carroll, Davies, and Richman (1971), were eliminated. Control words, chosen only on the basis of length and frequency, were also included. Table II shows the 104 words.

Table I. Description of Research Groups

Grade		*2*			*3*			*4*		
Reader Group		*Normal*	*Dyslexic*	*t*	*Normal*	*Dyslexic*	*t*	*Normal*	*Dyslexic*	*t*
N	Boys:	14	14		18	18		17	17	
	Girls:	5	5		11	11		6	6	
	Total:	19	19		29	29		23	23	
Means:										
Stanford Percentile		69	18	20.8*	69	12	33.4**	70	17	28.3**
Chronological Age		7.7	7.4	2.17	8.7	8.7	-.19	9.6	9.5	1.81
PPVT IQ		107	107	-.06	111	105	2.12*	116	113	.8
WRAT: Reading Achievement		3.7	1.7	6.19**	4.3	2.1	16.8**	5.9	3.8	6.15**
WRAT: Reading Standard Score		112	91	5.32**	108	86	13.28**	113	95	5.60**

**$p < .01$
*$p < .05$

Table II. Word List

Anagram Type

Set #	*Initial same*	*SFI*	*Scramble*	*SFI*	*Reversible*	*SFI*	*Control*	*SFI*
1	cloud	56.9	meat	59.4	won	59.0	magic	56.9
	could	72.1	team	60.3	now	71.4	first	72.1
2	form	66.7	felt	63.3	was	78.7	are	78.3
	from	76.5	left	67.4	saw	67.2	list	63.3
3	bread	58.9	tones	53.2	rats	52.7	moves	58.9
	beard	51.2	notes	57.5	star	58.2	sorts	51.2
4	aboard	54.0	flesh	51.6	loop	52.1	treaty	50.1
	abroad	50.1	shelf	54.0	pool	55.3	pine	55.3
5	there	74.6	how	73.8	no	72.1	place	69.0
	three	69.2	who	71.4	on	78.5	as	78.0
6	slate	44.2	traps	48.8	naps	41.3	blur	41.3
	stale	42.7	strap	47.8	span	48.9	jail	48.9
7	lair	37.7	epics	34.0	buts	35.7	fouls	34.0
	liar	40.0	spice	44.7	stub	41.5	smash	44.7
8	sloop	40.8	lemon	47.2	slap	46.6	acute	47.2
	spool	44.4	melon	42.5	pals	41.5	chink	40.8
9	crusty	32.0	smug	31.8	gal	38.9	jams	41.7
	curtsy	35.0	gums	41.7	lag	38.0	kirk	31.8
10	slain	45.7	mode	46.8	lee	43.2	lunar	48.3
	snail	48.3	dome	46.4	eel	44.9	rob	43.2
11	trial	53.2	eats	53.2	dam	53.0	root	57.6
	trail	57.1	seat	57.6	mad	54.4	pop	53.0
12	carve	45.8	hams	42.6	mar	38.9	hoard	34.7
	crave(d)*	34.7	sham	35.7	ram	47.2	bid	47.2
13	quiet	59.6	dear	58.3	raw	54.6	last	67.5
	quite	62.4	read	67.5	war	61.5	dug	54.4

*The word *crave* does not appear in the Carroll list, except in its past tense form.

Procedure

The subjects were tested individually in their own school buildings. The *Peabody Picture Vocabulary Test* (PPVT), Form A (Dunn 1958) and the reading subtest of the *Wide Range Achievement Test* (Jastak 1965) were given in the initial session. The Peabody test is a measure of receptive verbal IQ. The Wide Range Achievement Test provides a measure of graded reading achievement as well as age appropriate Standard Scores.

Following the paradigm of Mason et al. (1975), the item and order memory tasks were administered in a second testing session. The children were told that they would be shown a card with some letters to be read aloud. After the letters were read, the card was taken away and the child's task was to tell all of the letters he could remember. To insure that the children understood the task, the examiner gave some practice trials and any additional instruction required. Each card was exposed until the child read all of the letters. This generally took less than four seconds, but the children were given all the time they needed to read the letters aloud. Two sets of four, six, and eight letters were shown. Each child's score was the mean number correct on the set of four, six, and eight letters on which he did the best.

For the order memory task, the children were told that they would need to remember the order of the letters. Immediately after the letters had been read aloud, the examiner dropped the wooden chips from a paper cup onto a card in front of the child who then had to place them in the same order as on the card he had read. Practice was provided as it had been for the item memory test. The score was the mean number correct in each spatial position on the set of four, six, and eight letter strings on which the child did his best. If a letter was placed in the correct position but with incorrect orientation, it was still counted as correct.

The final task was word reading. The examiner instructed the subject to do his best to read every word, but if he could not read a word, it was all right to say "Pass." All words were shown to each child, and the task was untimed. Each response was scored as: (a) correct word, (b) sequence error, (c) other error, or (d) no response.

Results of the Study

Effect of Reading Group and Grade on Response Scores. Analyses of variance were carried out to determine effects of reading group (normal, dyslexic) and grade (second, third, fourth) on each of the four response scores (Correct, Sequence Error, Other Error, No Response). The results are summarized in Table III and described here by response type.

Table III. Mean Word Reading Scores for Normal and Dyslexic Readers at Each Grade Level

Grade	*2*			*3*			*4*		
Reading Scores	*Norm*	*Dys*	*t*	*Norm*	*Dys*	*t*	*Norm*	*Dys*	*t*
Correct	72.4	21.3	9.4**	84.8	41.8	12.7*	94.7	76.7	5.1**
Sequence	6.1	5.8	.2	5.6	8.2	-2.8*	3.5	8.3	-4.4**
Other	16.7	41.4	-5.0**	9.8	39.6	-11.3**	4.7	16.2	-4.9**
No Response	8.8	35.4	-4.0**	3.8	14.4	-3.6**	1.1	2.8	-1.5

** $p < .001$
* $p < .01$

Words Read Correctly yielded main effects of Reading Group and Grade, $F(1,136) = 253.79$, $p < .001$, $F(2,136) = 84.93$, $p < .001$; normal readers always read more words correctly than dyslexic readers. A significant *Reading Group x Grade* interaction, $F(2,136) = 17.35$, $p < .001$, resulted from decreasing differences with age between the normal and dyslexic readers. In sum, all readers were able to read more words correctly as they advanced through the grades, and differences favoring the normal readers narrowed with time.

Dyslexic readers made more "Other Errors" than normal readers, as seen in the significant main effect of the Reading Group, $F(1,136) = 135.93$, $p < .01$. The main effect of Grade indicates that "Other Errors" were reduced with advancing grade, $F(2,136) = 34.07$, $p < .01$. The *Reading Group x Grade* interaction, $F(2,136) = 8.95$, $p < .01$, reflects the narrowing of the differences between the groups by fourth grade.

The error category of "No Response" yielded main effects of the Reading Group, $F(1,136) = 35.70$, $p < .01$, and Grade, $F(2,136) = 26.34$, $p < .01$; normal readers made fewer refusals, and both groups improved by grade.

On Sequence Errors, the focus of the study, the pattern deviated from other response types. As with the other error types, there was a main effect of Reading Group, $F(1,136) = 12.99$, $p < .01$. The sequence errors of dyslexic readers, however, increased by fourth grade, while those of the normal readers decreased almost to zero by that grade. This difference is

reflected in the Reading Group x Grade interaction, $F(2,136) = 4.61$, $p < .05$. Sequence Errors for Dyslexic readers, therefore, provided the only deviation from the trend for all readers to increase accuracy and reduce error types as they advanced in grade.

Further analysis, by word types, will demonstrate that the Initial Same anagrams accounted largely for the pattern of dyslexic readers' increase in sequence errors.

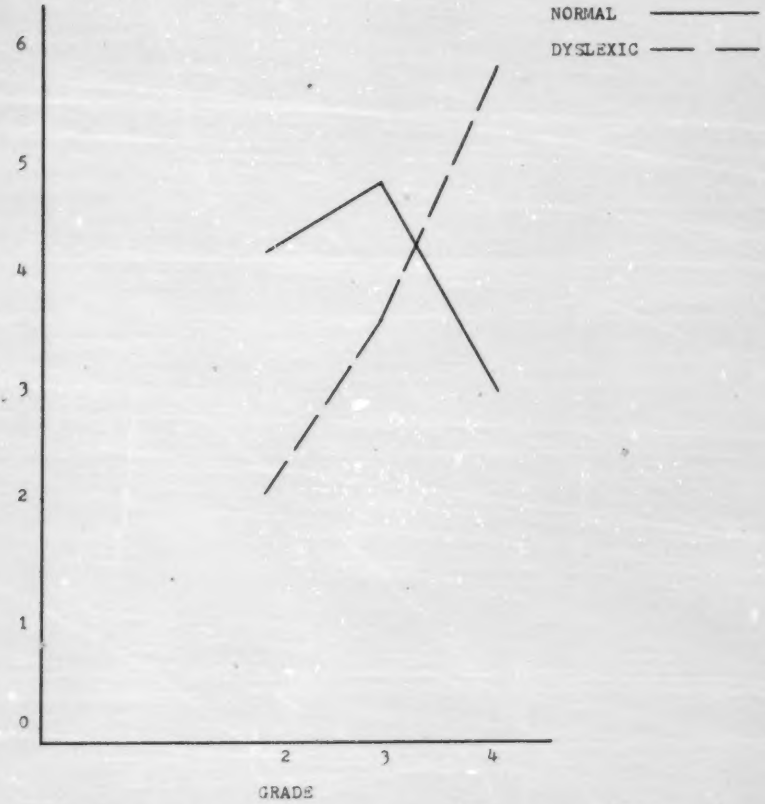

Figure 1. Sequence errors on "I" words.

Effect of Anagram Type on Sequence Errors. Figures 1, 2, 3, and 4 summarize Sequence Errors on the anagram types of normal and dyslexic readers at each grade level. Analysis of variance, using Sequence Errors as the dependent variable, yielded a significant main effect of Word Type,

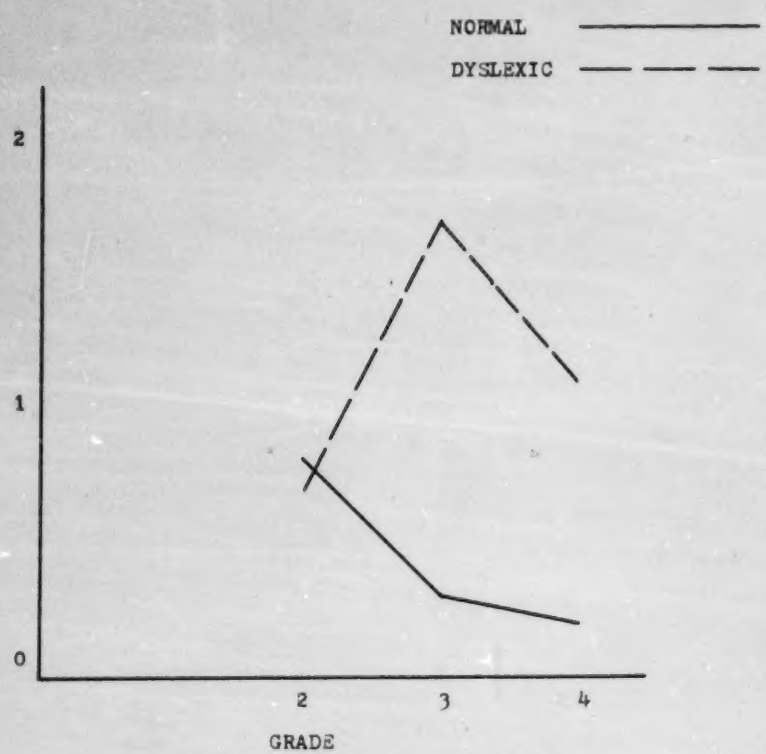

Figure 2. Sequence errors on control words.

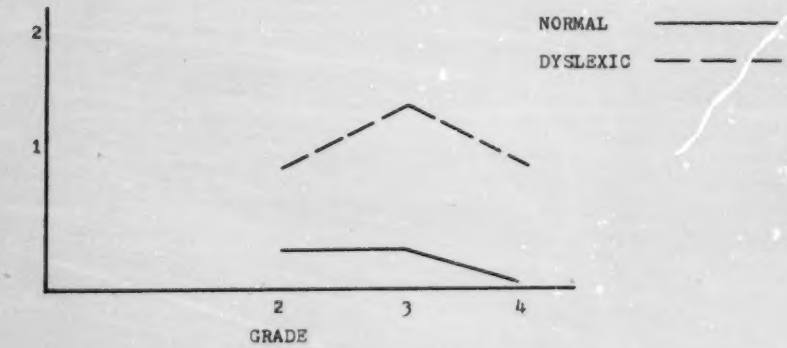

Figure 3. Sequence errors on scrambled words.

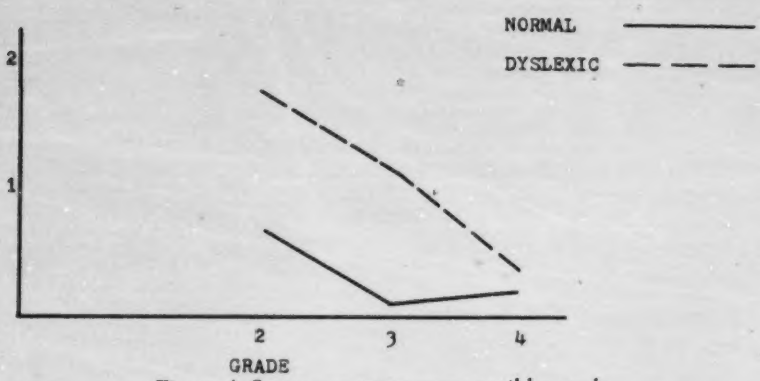

Figure 4. Sequence errors on reversible words.

$F(3,408) = 262.87$, $p < .001$; most Sequence Errors occurred on the Initial Same anagrams.

Word Type and Reading Group showed a significant interaction, $F(3,408) = 6.67$, $p < .001$; Word Type affected normal and dyslexic readers differently. Although both groups made most of their Sequence Errors on Initial Same anagrams, dyslexic readers also made more Sequence Errors on all other words types.

Word Type x Grade yielded a significant interaction, $F(6,408) = 6.69$, $p < .001$; a result of the dyslexics' increased Sequence Errors on Initial Same anagrams over the grades, while this error decreased on the other word types.

The foregoing results show that Initial Same anagrams were the source of the enigmatic results of this study: Sequence Errors on "I" words were the only errors made more often by normal readers (at second and third grades) and the only errors that increased for fourth grade dyslexics while all others sharply declined.

Other Results. Though not a major focus of the study, a comparison was made between normal second grade readers and dyslexic fourth grade readers. Although they differed in age and grade, they were similar in IQ, Item Memory, Order Memory, Reading Achievement, Words Read Correctly, Sequence Errors, and Other Errors (Table IV).

The influence of sex on error type was also examined. There was a main effect of sex on Sequence Errors, $F(1,130) = 9.84$, $p < .002$; girls made more Sequence Errors than boys. This difference was accounted for by the dyslexic girls.

Table IV. Comparison of Normal Second Grade Scores With Dyslexic Fourth Grade Scores

Variable	*Normal Second Graders*	*Dyslexic Fourth Graders*	*t*
Age	7.7	9.5	-16.57**
IQ	107	113	-1.21
Reading Achievement	3.7	3.8	-.35
Words Correct	72.3	76.6	-.91
Sequence Errors	6.1	8.3	-1.59
Other Errors	16.7	16.4	.16
No Response	8.0	2.0	2.20*
Item Memory	5.2	5.2	-.24
Order Memory	3.9	4.0	-.43

** $p < .01$
* $p < .05$

Item Memory and Order Memory. Item Memory and Order Memory by Reading Group and Grade are shown in Figure 5. Both yielded a developmental increment across the grades, and normal readers always scored higher than dyslexics.

Table V illustrates the correlations between Item Memory and Sequence Errors. For normal readers, Item Memory was not related to Sequence Errors. For dyslexic readers, however, Item Memory correlated (.40) with Sequence Errors, on "I" words only.

Correlations between Order Memory and Sequence Errors are also shown in Table V. There was a small but significant negative relationship between Order Memory and Sequence Errors (-.27, $p < .05$) for normal readers. No such relationship was demonstrated for dyslexic readers.

In summary, the results suggested a relationship between Order Memory and Sequence Errors for normal readers, but not for dyslexic readers.

Discussion of the Results

The unexpected results of this study may best be understood from a developmental point of view, and a redefinition of sequence errors on "I"

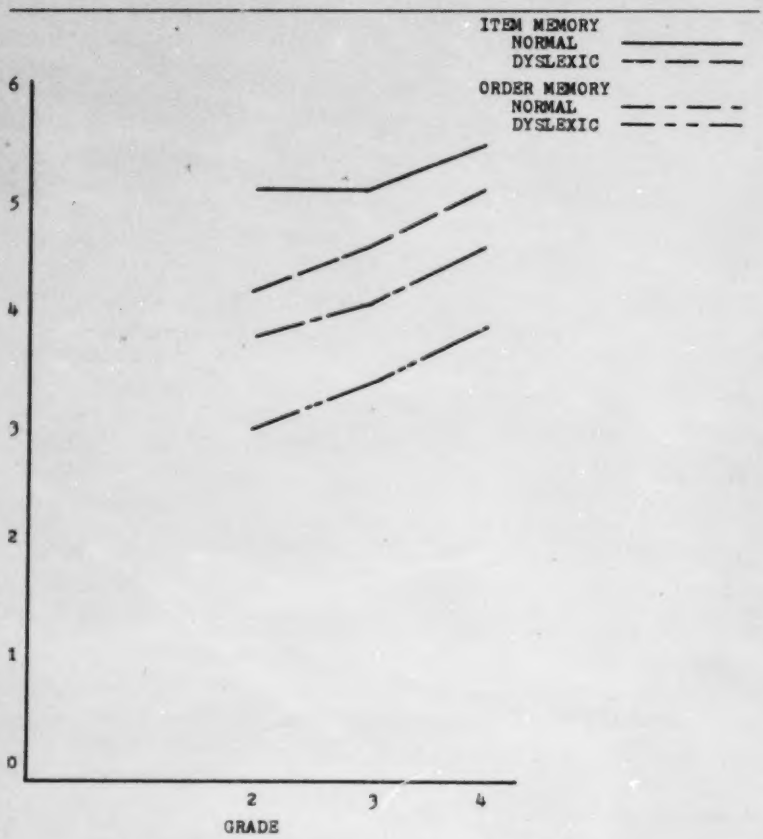

Figure 5. Item memory and order memory.

words. The major hypothesis to account for these data is that so-called Sequence Errors of dyslexic readers are related to a developmental lag, manifested specifically in immaturity of part-whole integration, and generally in reading and cognitive behavior similar to that of younger, normal readers.

Sequence errors on the Initial Same anagrams of this study may be explained in terms of the readers' immaturity of perceptual integration. The Initial Same anagrams required the ability to integrate embedded sequential details with the more salient cues such as initial letter, length and shape, a process requiring developmental maturity. Previous researchers have considered the confusion of words such as *carve* and *crave* to be a

Table V. Correlations between:
Item Memory and Sequence Errors
Order Memory and Sequence Errors

	Sequence Errors			
	Item Memory		*Order Memory*	
Word Type	*Normal*	*Dyslexic*	*Normal*	*Dyslexic*
Initial Same	.04	.40**D	-.21	.18D
Scrambled	-.07	-.00	-.14	-.04
Reversible	-.02	-.19	-.18	-.20
Control	-.20	-.18	-.25*	.07
Total	-.09	.21	-.27*	.06D

** $p < .01$
* $p < .05$
D difference between correlations $p < .05$

problem of sequential processing or memory, whereas this study interprets such errors to be the result of immature operation of perceptual integration.

Normal readers, whose ability to read increased with each grade level, showed a marked decrease in Sequence Errors on Initial Same words by fourth grade, the same level at which they can integrate the whole and the parts in picture identification (Elkind 1964, 1969). Dyslexic readers also showed decreases in errors other than those of sequence on Initial Same anagrams. The lack of improvement on these errors, however, reflects the fact that they had not yet attained the cognitive ability to integrate part-whole cues sufficiently well to scan the inner details of ambiguous words.

Useful to this explanation are the theories and findings of Elkind (1964) and Gibson and Levin (1975). Elkind (1970) defined perceptual integration as the "ability to organize parts and wholes in such a way that both retain their unique identity, without at the same time losing their independence" (p.140).

Through his studies of children from primary to fourth grade, Elkind (1964, 1969) articulated and extended Piaget's conception of perceptual development in terms of the child's progression from centration to decentration, i.e., from focusing on the parts while ignoring the whole or on the whole while unmindful of the parts.

Elkind's stimuli were pictures whose parts and wholes consisted of different recognizable objects, i.e., pieces of fruit assembled in the shape of an airplane. Primary school children centered on either the parts or the whole, an indication of immaturity of perceptual integration. It was only when subjects were at the fourth grade level that most were able to integrate, and respond, "an airplane made of fruit." These findings indicate that integration of the whole and its parts is a function of perceptual maturity.

Elkind (1970) found that children's abilities to read were related to their performances on tests of perceptual integration, and suggested that similar logical perceptual operations are required in word reading as are needed for part-whole integration.

Gibson and Levin's (1975) approach to the problem of reading offers a different perspective which, when added to Elkind's, forms the basis for the explanation that sequence errors on Initial Same anagrams are the result of immaturity of perceptual operations.

Gibson and Levin theorized that children perceive words by noting their distinctive features in a process of selective detection of information. With advancing age, children are able to extract higher order features. A word in isolation offers several features which are cues to its identification: initial letter, shape, length, and the linear arrangement of its letters, as well as higher order syntactic, semantic, and linguistic cues. Efficiency in word reading requires rapid integration of the smallest number of critical cues that will lead to the correct identification. The reader usually does not require all of the features to identify a word. He often can do so with only initial letter, length, shape, and familarity. However, these cues are not sufficient for certain words whose interior detail is essential for proper identification. The "I" words in this study, such as *bread*, *beard*, *carve*, and *crave*, require the reader to utilize cues of interior detail in addition to the commonly used information about initial letter, length, and shape. Thus, they demand an advanced level of part-whole integration.

This part-whole integration is a result of perceptual maturity. Errors of sequence on "I" words in normal readers should and do decrease with advancing grade level. The older, normal readers, particularly those in fourth grade, had reached a level of maturity of perceptual integration necessary to enable them to coordinate those higher order interior sequential details with the other cues. Their inability to integrate prior to this time resulted in their elevated level of sequence errors on "I" words, while they made no such errors on less ambiguous words.

Dyslexic children whose reading also improved with advancing grade, could not, by fourth grade, integrate the interior details with the holistic clues of initial letter, length, and shape. Yet such integration is the requisite for properly identifying the "I" words. The dyslexic readers' perceptions mirrored those of the preintegration second grade normal readers. Thus, the dyslexic fourth grade readers responded to "I" words as the normal second grade readers did, on an immature level of perceptual integration, even as they improved on all other aspects of word reading.

If "sequence" errors on "I" words are redefined in terms of perceptual part-whole integration, then order memory is seen to be unrelated to these errors for younger children. This hypothesis would predict that order memory is related to sequence errors only when children are mature enough to process the sequential interior details of the words.

To summarize the major hypothesis: Sequence errors on "I" anagrams were actually manifestations of immature perceptual integration when made by younger normal and all dyslexic readers. Older normal readers, who had attained the ability to integrate the wholes and parts of words, were the only children who were fully processing the sequential inner details.

These data also suggest that the dyslexic readers demonstrated a developmental lag by performing like younger normal readers on all tasks.

Application of the Perceptual Hypothesis to the Results of the Study

The perceptual hypothesis, combined with the notion of a developmental lag for the dyslexic readers, can account for most of the results of the study.

First, normal younger readers performed better than their dyslexic agemates on all tasks except Sequence Errors. Most second grade children, both normal and dyslexic, are not yet integrating the part-whole cues, a requirement for the Initial Same anagrams. While normal second-graders could more effectively exploit holistic stimulus cues and thus perform better than dyslexics in other tasks, their inability to integrate interior detail prevented their superior performance when sequence was critical.

By fourth grade, the normal readers demonstrated maturity in part-whole integration. Responding to detail as well as gross cues substantially reduced their sequence errors. Dyslexic readers, while improving on the holistic aspects of cue utilization, could not reduce their sequence errors. They had failed to arrive at the developmental milestone of perceptual integration, and were thus forced to yield to the cognitive ambiguities inherent in Initial Same anagrams. Thus, on these words they performed like normal second graders.

The final piece of data related to the notion of a developmental lag for the dyslexic readers is the similarity on almost all tasks of the dyslexic fourth graders and the normal second grade readers.

Second, Initial Same anagrams accounted for over 80 percent of the normal readers' "sequence" errors, and over 50 percent of the dyslexics'. If these were "real" sequence errors, errors based on sequential processing or memory, they would have been distributed over the other word types. The fact that this did not happen argues against the notion that sequential processing was related to such misreadings.

Although few in number, sequence errors were made more often by dyslexic readers than by normal readers on the reversible, scrambled, and control words. From a clinical point of view, an unusually large number of such errors may indicate a defect in sequential processing, or a gross misinterpretation of distinctive feature information. Other populations, such as neurologically impaired poor readers, may be characterized by a large number of these possible sequential processing errors, as Bakker (1972) found, but this was not true for the otherwise normal poor readers in this study.

Third, the apparently anomalous results of the correlations between memory factors and word reading errors may be better understood if sequence errors on "I" words are redefined.

Correlations between order memory and sequence errors lend support to the suggestion that younger normal readers and all dyslexic readers were not exploiting order information, while older normal readers were. These correlations reveal low and nonsignificant correlations for Sequence Errors and Order Memory for all grades and groups of readers with one exception: normal fourth graders show correlations of -.52 ($p < .01$) between Order Memory and total Sequence Errors, and -.53 ($p < .01$) between Order Memory and Sequence Errors on "I" words. Here is additional support for the contention that normal fourth grade readers were the only group processing sequential details.

Antecedent-Consequent Relationships

A major goal of this study was to validate the antecedent-consequent model of reading dysfunction by demonstrating the relationship between verbal sequential order memory and sequence errors in word reading. The results, however, support a single factor, developmental delay model

instead. The attempt to demonstrate relations between order memory and sequence errors for dyslexic readers was unsuccessful. No doubt this research on antecedent-consequent relations was confounded by the Initial Same anagrams and the fact that even dyslexic readers made few sequence errors.

Despite the failure to find the anticipated links between cognition and word reading errors, the model shows the potential for explaining reading errors in terms of their cognitive underpinnings, provided that a more sophisticated, developmentally-based approach is used. For example, normal readers showed demonstrable relations between memory and sequence errors only after a certain age. Perhaps in fifth or sixth grade this would also be true for dyslexics. For younger children performance on certain Piagetian tasks might have predicted particular error types or accuracy rates. Perhaps, also, categories of mistakes, rather than single errors, might be related to cognitive antecedents, as Kehoe (1976) has suggested. Further expoloration of word-reading errors and their relation to cognition will, in any case, advance understanding of both the normal and nonnormal acquisition of reading.

The persistence of sequential order errors by dyslexic children past the fourth grade and even into adolescence has been noted. Further study is needed to determine the degree to which they persist beyond the elementary school years and their specific nature and frequency of occurrence

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Psychological Evaluation of Specific Learning Disorders

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The purpose of this paper is to outline the various psychological dimensions associated with learning disabilities. Emphasis will be given to the utilization of standard psychological tests in diagnosis, although non-standardized clinical procedures will be outlined as adjuncts to traditional measures. The discussion will be based in a psychological and phenomenological perspective which relies upon normal developmental milestones as criterion references. Because of the lack of convincing data for any theory on causation or any unique method of treatment, etiological and remedial considerations will not be included. Remedial treatment is at best an inexact science and more often an effective art form. Beyond reducing parental and professional anxiety and suggesting possible hereditary causation, etiological studies have added little to our understanding of specific learning disorders. With the present state of knowledge, a flexible and open attitude with diagnosis and treatment, based upon developmental and phenomenological observations, appears to be the most sensible and effective course of action.

The diagnosis of specific learning disorders is a complex and controversial undertaking that involves a variety of professional disciplines which include psychology, education, medicine and speech pathology. Recent action by the U.S. Department of Health, Education and Welfare has attempted to clarify the basic issues regarding learning disabilities, such as what constitutes a learning disorder and who should diagnose such problems (Federal Register, Volume 41, No. 230).

Historically, specific learning disabilities have been diagnosed through the elimination of possible causes for the child's learning problems and definitions of learning disabilities have reflected this trend. The United

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States Congress has defined "children with specific learning disabilities" as follows:

> Those children who have a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, which disorder may manifest itself in imperfect ability to listen, think, speak, read, write, spell, or do mathematical calculations. Such disorders include such conditions as perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia and developmental aphasia. Such term does not include children who have learning problems which are primarily the result of visual, hearing or motor handicaps, or mental retardation, of emotional disturbance, or of environmental, cultural or economic disadvantage. (Section 5 (b) (4) of Public Law 94–142.)

Research has identified behavioral, perceptual and psychological deficits in children who were failing to learn for no apparent reason. Among identified deficits are dysgraphia, particularly in spontaneous writing and spelling (Critchley 1964; Kinsbourne and Warrington 1966); right and left directional confusion (Money 1962); mixed dominance (Orton 1937); finger agnosia (Kinsbourne and Warrington 1966); impairment in form perception (Benton 1962); dyscalculia (Belmont and Birch 1966; Critchley 1970); and in verbal performance (Reed 1967). Johnson and Myklebust (1965) list additional problem areas that include auditory memory and processing, memory for series and sequence, perceptual motor disturbance, electroencephalogram abnormalities and lag in social maturity. Many of these deficits are found in statistical comparisons between learning-disabled children and normal children, but are not always found in individual cases. In addition, experts are not in total agreement regarding the frequency or reliability of these related phenomena (Crinella, Beck, and Robinson 1971; Satz and Sparrow 1970).

Although conclusive and definitive research remains to be done, the empirical findings do allow the clinician to take an aggressive approach in the diagnosis of specific learning disorders. The first task is to rule out primary causes of psychoeducational delay, such as subnormal intelligence, primary emotional disturbance, cultural and experiential deprivation, inadequate academic instruction and primary physical sensory handicap. The second task is the differential diagnosis of learning disorders. This can be done with more conviction and with greater applications for education and remediation by examining a spectrum of language, associational, perceptual

and motor functions in an individual child and by giving special attention to the "symptoms" consistently associated with such disorders.

Diagnosis and Evaluation

Test Battery

A complete and thorough evaluation of a child for learning disabilities usually requires four to six hours of testing and interviewing. Although abbreviated test batteries are often given because of the pressures of time and expense, the psychologist should try to obtain measures of as broad a sample of skills as possible. After examining a wide range of test instruments, I have found the following to be the most efficient in terms of time required and information obtained: (1) a complete medical, developmental, social, and academic history; (2) Wechsler Intelligence Scale for Children—Revised (WISC—R); (3) Bender-Gestalt Test; (4) Beery Developmental Test of Visual-Motor Integration; (5) Wide Range Achievement Test (WRAT); (6) Gilmore Oral Reading Test, Form C; (7) Durrell Silent Reading Test; (8) vision and hearing tests; (9) Goldman-Fristoe-Woodcock Test of Auditory Discrimination; (10) selected subtests (visual memory, auditory memory, and visual closure) of the Illinois Test of Psycholinguistic Abilities (ITPA); (11) handwriting sample; (12) Lindamood Test of Auditory Conceptualization; (13) tests of dominance and directionality; (14) Peabody Picture Vocabulary Test (PPVT).

In addition, either through formal testing or clinical observations, some data on balance, tactile functioning, extraocular tracking movement, and attentional capabilities should be gathered. I usually administer the ITPA subtests to persons over ten years of age because it is not unusual to find learning-disabled adults and adolescents functioning at a six- to seven-year level of sophistication in tasks of sequential memory.

This evaluation and test battery is modified to the child's individual needs with emphasis upon areas of specific concern to parents. For example, if primary or secondary emotional problems are suspected, the examiner may want to give a mental status examination, a Minnesota Multiphasic Personality Inventory, a Thematic Apperception Test, a Rorschach Inkblot Test, or other psychological measures. Even where emotional and adjustment problems are found, however, careful attention is paid to the child's learning and developmental profile. Within the test battery, an examination of specific subtest trends allows for an assessment of the

various intellectual, language, and perceptual functions which underlie the successful acquisition of secondary language symbol skills in reading, writing, spelling, and mathematical calculations.

General Considerations

The first step in the diagnosis of a specific learning disorder is to rule out some of the possible causes. Many experts require the finding of a two-year delay in academic achievement for a child to qualify as learning-disabled (Waites 1969). While this position is a safe and conservative one, it does not take into consideration the exceptionally bright youngster. It is not unusual for a child to have an intelligence quotient in the superior range and academic skills at or near grade expectation. Such children may be learning-disabled but may have compensated for their disabilities through determination and excellent intellect during the early school years. Their failure to function above grade level, therefore, may be considered an educational lag. Differential diagnosis for them should be based on a careful examination of specific deficit patterns and the presence or absence of the functional "symptoms" associated with learning disorders. The very bright youngster with mild learning disabilities, often overlooked during the early school years, may develop serious psychological and learning problems as the work becomes more complex and involved in the upper elementary grades and in the junior high school.

The medical and developmental history will screen for the possibility of cultural-experiential deprivation or of inadequate educational opportunities and instruction. In addition, through history or a brief screening, primary sensory deficits such as deafness, blindness, or agnosia can be ruled out as etiology.

Traditional intelligence tests including the WISC-R and the Stanford-Binet Intelligence Scale can rule out subnormal intelligence. Because the intellectual profile is often uneven, assessment should not be made on IQ scores alone. The child's social adjustment and general comprehension should be reviewed since specific deficits often reduce the overall IQ score, with verbal intelligence the most likely to suffer. In determining intellectual functioning, therefore, an examination of subscale scatter is essential. If the child is at or near normal levels on the WISC-R on similarities, comprehension, vocabulary, and picture arrangement, it is likely that the youngster has at least average abstract reasoning abilities. Since recognition skills are generally much stronger than recall skills in children with learning disabilities, the Peabody Picture Vocabulary Test often provides a more accurate

estimate of the child's intellectual level than the Stanford-Binet or the WISC-R. A strict utilization of full scale IQ scores is not an adequate assessment of intelligence in children with specific learning disorders.

Ruling out a primary emotional disturbance is quite difficult. Approximately seventy-five percent of all children with learning disabilities have or develop emotional problems in varying degrees (Gates 1941). The determination of whether the personality disturbance is primary or secondary usually reflects the biases of the examiner more than the actual etiology. For practical purposes the responsible clinician needs to examine the possible causal factors, but in most cases both educational and psychological considerations must be dealt with. Psychological and educational problems usually go hand in hand and ultimately present a circular problem with one feeding upon the other. By an examination of learning disability "symptoms" the presence of specific learning disorders can be assessed even within a primary emotional disturbance. It is important, however, to determine if emotional and personality problems will negate successful remedial work until psychological or psychiatric treatment is well underway. In general, when emotional disorders are present, a combination of educational and psychological treatments are optimal.

Once the contribution of primary etiological factors has been ruled out, the examiner may turn his attention to an evaluation of the child's individual learning style with emphasis given to the "symptoms" classically associated with learning disorders.

Specific Functional Deficits

Reading. Reading is the basic educational skill upon which all other academic subjects depend. Generally, children progress at an even pace towards literacy. Early reading experiences introduce basic word-attack skills. The child progresses from monosyllabic words (*see, go*) to compound words (*football, seesaw*) and to polysyllabic words. Longer sentences, smaller print and more densely placed polysyllabic words in sentences are introduced until the youngster becomes literate.

The evaluation, therefore, should yield information in several areas of reading: (1) oral reading; (2) silent reading; (3) reading comprehension; and (4) word recognition.

Oral reading can be assessed by a number of tests of which two of the most commonly used are the Durrell Test and the Gilmore Test of Oral Reading-Form C. The test paragraphs move from monosyllabic to compound to polysyllabic words. By noting the paragraphs in the Gilmore Test that the

child is able to read, the examiner can determine the level within the literacy sequence at which the child is functioning. The silent reading can be assessed by using the Durrell Silent Reading Test, the Gates-MacGinitie Reading Test, or the Comprehension Subtest of the Peabody Individual Achievement Test (PIAT). Reading comprehension is measured by such tests as the Durrell Test, the Gates-MacGinitie Reading Test, the PIAT, and the Gilmore Oral Reading Test. It is important to note differences in comprehension between oral and silent reading, particularly for possible implications regarding auditory processing and anxiety over reading. The PIAT often produces higher scores than other comprehension tests which present a child with recall problems. The WRAT and the PIAT measure word recognition.

In addition to the level of sophistication in word reading (monosyllabic words, compound words, polysyllabic words), the clinician will wish to notice the kinds of errors made in reading. This task may involve clinical observations or may be a part of the formal scoring procedures on some tests.

A global assessment of reading yields two basic reading strategies—sight recognition and phonetic word attack skills (Myklebust 1965). Sight or whole word reading requires the child to recognize instantaneously the whole printed word as a gestalt. Most reading is done through recognition of words and phrases as visual gestalts. When unknown words are encountered the reader must sound out individual letters or syllable components by phonetic analysis and synthesis. The reading process normally relies on both gestalt and analytic methods and both components should be examined. The child who has visual-eidetic deficits may be unable to remember word configurations and will rely predominantly on word analysis in reading. General reading style will be slow and stumbling since word-by-word phonetic analysis is necessary. A child may have good visual imagery and word recognition skills, but have auditory processing skills that disrupt phonetic analysis. He can quickly and easily recognize known words but be baffled by new, unknown words. Thus, the child's word attack skills are quite important. Does the youngster use phonetic skills or sight reading? Can the student make use of linguistic cues within the sentences to determine unknown words? The most common errors in reading include mispronunciations, the transposition of letters and whole graphemes, omissions of words and parts of words, substitutions of words and phonemes, and the addition of words and syllables within sentences. Most psychologists are not skilled reading diagnosticians, but they can make a survey of reading errors by carefully observing the child as he reads.

Spelling. The most commonly used tests to assess spelling are the spelling tests on the WRAT and the PIAT. It is helpful to give both of these tests because they measure very different skills. Scores on the PIAT are often significantly higher than WRAT scores in learning-disabled children. The spelling test on the PIAT is essentially a recognition test. The child is able to select which of the four words presented is the correct spelling of the dictated word. On the other hand, the WRAT spelling test is a recall test. The child must correctly spell a dictated word from memory. Since recognition abilities are generally much higher than recall abilities in children with learning disorders, the WRAT spelling score is usually a better indicator of what the child is actually able to accomplish in the classroom.

An examination of the types of spelling errors is helpful for diagnosis and remediation. In children who have difficulty with nominal retrieving, the recognition-recall discrepancy between the PIAT and the WRAT will be particularly pronounced. These students may be phonetic misspellers (luv for love) if auditory phonetic processes are intact (Boder 1973). In addition, spelling errors show phoneme/grapheme omissions and substitutions (Weinberg, Rogers and Dietz 1975). Omissions appear to represent a lack of recall of the phonemes that make up a word. Substitutions may involve a breakdown in retrieving from memory either the correct phoneme or the grapheme that symbolizes a particular phoneme sought in spelling a word. Reversals and rotations of letters and numbers are common in specific learning disorders. Lower case *d* and *b* are confusing as are *M-W*, *p-q* and *n-u*. These are examples of symbols which have the same basic configuration but a difference in directionality. Children with problems of laterality and directional confusion are very likely to rotate and reverse symbols. Transpositions errors (*when/wehn*) are common in children with deficits in sequential memory. Often such children will have similar transposition errors in their reading: *saw-was*, *dog-god*, *live-evil*, *tip-pit*, or *not-ton*.

The child who has specific problems in auditory processing with subsequent disruption of phonetic analysis and synthesis will have spelling errors on words above his level of sight vocabulary (Boder 1973). Attempts at spelling "unknown" words will show a significant inability to spell phonetically. Such words will often be so bizarre in their misspellings that they are unrecognizable even by the child himself. In contrast, the auditory deficits will not disrupt spelling words that the child knows and is able to re-visualize. Words within the range of the child's sight vocabulary will

usually be spelled correctly even when they are irregular, non-phonetic words. Addition or omission errors are not uncommon and often the child will substitute words of similar visual configuration such as *horse* for *house* or *step* for *stop*. In contrast the child with primary problems in visual-eidetic processes will have a poor memory for visual gestalts but may be a phonetic misspeller (Boder 1973). The child may make good phonetic approximations for words beyond his reading level such as *hows* for *house* or *tok* for *talk*. Misspellings do not have the strange, unfathomable quality noted in the child with auditory deficits although simple sight vocabulary words may often be misspelled. A combination of the various types of spelling errors is not unusual in learning-disabled children. Spelling is the language symbol skill most resistant to remediation and children who master reading and handwriting often remain poor spellers as adults.

Writing. A serious disorder in written expression is termed *dysgraphia*. The most efficient and straightforward method of assessing handwriting is to ask the child to write. Usually I require the youngster to write a short paragraph about whatever he wishes. In addition, I ask that he copy a paragraph from the Gilmore Oral Reading Test at a level commensurate with his reading level. The rate of copying should be noted by recording the length of time required to copy or write the paragraphs. A words-per-minute or a letters-per-minute ratio can be computed. There are few published standards for handwriting evaluation although general guidelines for quality and rate are published by Paul V. West and the A. N. Palmer Company in the American Handwriting Scale.

Most psychologists use a subjective global assessment of a child's writing skills, noting general clarity and specific errors. Dysgraphic students produce a sloppy paper and use inconsistent writing pressure. Often, pencil grasp is incorrect and the pencil is held with a great deal of pressure. When consistent heavy pressure in writing or in grasping the pencil is noted, further screening for tactile agnosia should be done. Space usage and visual organization are poor. Children will often be unable to stay between the lines when writing and a great deal of erasing is not unusual. Letters are poorly formed and often unrecognizable out of context. Uneven letter size and a failure to separate words are common. Generally, poor writing performance is accompanied by a slow rate of production. Not only is the work of poor quality, but the process of written expression is difficult and tedious. Many children will refuse this task or become visibly tense and anxious. They will severely criticize their work and make disparaging

remarks about themselves. If information is not available regarding rate of production, the coding subtest of the WISC-R has shown itself to be highly correlated with writing rate.

Arithmetic. The evaluation of arithmetic skills should include at least three dimensions: (1) level of functioning; (2) mathematical reasoning and conceptualization; and (3) calculations. Frequently used tests are the WRAT, the PIAT, the arithmetic subscale of the WISC-R, and Key Math Test. The child's level of functioning includes an assessment of current grade attainment of math skills as well as specific abilities such as addition, subtraction, carrying, borrowing, long division, or percentages. The Key Math Test gives a structured schema for assessing the level of functioning. Mathematical reasoning can be assessed by examining the arithmetic subtest of the WISC-R and the arithmetic test of the PIAT. Both measures assess mental computation and the ability to conceptualize math problems. The arithmetic portion of the WRAT tests calculation skills, and a comparison of WRAT scores with WISC-R and PIAT scores can help analyze whether the problem lies in calculation or in basic mathematical reasoning. When problems in calculation skills are found, the deficit may be one of orientation and disorganization in reproducing symbols on paper. Messy figures and uneven columns of numbers often cause errors. Also, children with problems in sequential memory may make calculation errors by failing to carry out all the required steps in the process or by performing them in the wrong order.

Perceptual-Motor Skills. The evaluation of perceptual-motor development usually involves the child's reproducing complex symbols and geometric forms. A number of tests are available for the assessment of these skills. Probably the most well-known test is the Bender-Gestalt Test. The Bender-Gestalt provides a measure of visual and spatial organization as well as graphic skills. A number of scoring systems are available (Pascal and Suttell 1951; Walkins 1975), although none show any particular advantages over the simple and well-known scoring system of Koppitz (1963). The Beery Test of Visual Motor Integration provides a measure similar to the Bender-Gestalt although the presentation requires less structuring and organization by the child. A comparison of the level of functioning between the Bender Test and Beery's Test provides a good clinical measure of deficits in organizational and planning capabilities. The Frostig Developmental Test of Visual Perception provides a finer breakdown of visual motor skills, including form constancy, figure-ground orientation and spatial relations. A complex and long test which shows promise for evaluation of perceptual motor deficits is the Southern California Test of Sensory Integration (Ayres 1974).

A reliable and easily administered test is the Draw-A-Person Test. Although little support has been found for psychological interpretation, a developmental scoring such as provided by Goodenough (1926) gives an index of visual-motor development as well as body awareness and schema, attention to detail and primary sexual role awareness. Less structured clinical screening may include asking the seven to eight year old to draw a clock from memory, having the five to seven year old print dictated letters or numbers, or requiring children above seven and a half years of age to print or write a short paragraph.

An examination of the test and subtest patterns on a number of traditional instruments can be of help in evaluating perceptual motor development. The Rorschach Inkblot Test is normally used as a personality measure but the basis of Rorschach scoring involves an assessment of perceptual-associational functioning. From a perceptual perspective, the Rorschach can give valuable information regarding visual analysis, visual organization, perceptual style, attention to details and perceptual-associational processing and integrity. The visual closure subtest of the ITPA is a good measure of figure ground perception and whole-from-part synthesizing and recognition (Paraskevapoulos and Kirk 1969).

A careful analysis of subscale scatter on the WISC-R can provide information regarding perceptual motor abilities. The scores on block design, picture completion and object assembly will reflect the child's ability to visualize and process the form, location and relative positions of objects in space. Visual analysis, visual organization and some manipulative skills are also necessary for successful completion of object assembly and block design. The coding subtest is highly correlated with handwriting rate and provides a measure of psychomotor speed as well as memory for symbols. The mazes subtest requires visual planning and analysis and will often reflect the youngster's motivation and persistence when faced with difficult tasks.

Within the general perceptual-motor framework, a frequent cause of poor performance is tactile agnosia or stereoagnosia. This deficit in proprioceptive feedback from hand to brain disrupts paper and pencil skills and is a major indicator in diagnosing developmental Gerstmann's Syndrome (Kinsbourne 1968). The examiner will get a clue that stereoagnosia is present if the child consistently grasps his pencil very tightly and uses unusual hard pressure when writing. Several simple measures can be used to determine if the child does have a tactile agnosia.

One way in which to test for tactile agnosia is to cover the youngster's hands and give him common objects such as a coin, a comb, a key or a block and ask him to name what he feels. If the psychologist wishes to use a

recognition task, he may get two sets of matched blocks which are cut into various geometric shapes and ask the youngster to point to the block which is the same as the block he feels in his covered hand. In adults and adolescents one can use a finger differentiation test in which a patient closes his eyes while the examiner simultaneously touches two of his own fingers to one or two fingers of the patient (Kinsbourne 1968). The patient is asked to tell how many fingers the psychologist is touching. After a training period a correct score on 6 out of 8 responses is considered a "pass." One can also use an in-between test in which a child is touched on two fingers and asked, "How many fingers are between the ones I am touching?" (Kinsbourne 1968). Following a demonstration, a score of 6 out of 8 correct responses is again a "pass." Thus, through the use of simple and quick screening procedures tactile deficits can be evaluated and their contribution to perceptual-motor problems delineated.

Lateral Dominance and Directionality. At approximately six years of age, most children establish dominance and consistently prefer to use one side of their bodies in dealing with the world. Incomplete or mixed dominance has been associated with specific learning disorders, although some research suggests that mixed dominance is not a problem in itself; rather, problems arise when children have confusion in directionality or right-left discrimination (Belmont and Birch 1973).

Dominance can be evaluated easily by simply noting which hand, foot, and eye the child prefers to use. Preferred hand is established by asking the child to write, to throw a ball, or to show how he brushes his teeth. Preferred foot is found by asking the youngster to kick a ball or hop on one foot. If the child is given a paper rolled into a cone or a toy prism viewer, he will hold the object up to the dominant eye.

Problems with right-left awareness can be assessed by using a series of questions derived from Piaget (1951). The child is required to show his right hand, left hand, right leg, and left leg. He is then asked whether various objects in the room are to his right or to his left. He is also required to point out the right and left extremities on a doll or on the examiner. Next, several familiar objects, such as a pencil, a book, or a key, are laid side by side, and the child is asked to tell if one object is placed to the right or left of the other. Finally, the child may be asked to do a series of right-left discrimination exercises, such as touching his left leg with his right hand, touching his right ear with his right hand, or touching his left foot with his left hand. In addition to these straightforward exercises, observing the child's writing skills can reveal left-right confusion. A child with problems of orientation

may have difficulty with *d* and *b*, with *J* and *E*, *M* and *W*, and with *s* and *z*. Reversals and rotation of any letters or numbers may occur at any given time.

Nominal Retrieving. Nominal retrieving involves the ability to recall upon demand names of persons, places, and objects. Children with such deficits will be delayed in learning to name colors, shapes, letters, and numbers. Recognition skills will be significantly higher than recall skills. A three-year-old child will be able to point to the green chair when asked to show what object is green, but may be unable to name the color "green" when asked the chair's color. The youngster apparently has the information in memory storage, but problems arise in sorting through the mass of data stored in memory and finding the exact name wanted.

Problems with nominal retrieving will often show up in the child's manner of speaking. The youngster will be unable to use specific words at will and to say what he wishes with exactness and precision. It is not unusual for the child to substitute words, e.g. "ask" for "answer" or "laugh" for "funny." Since circumlocutions are common, the child is likely to ramble in his speech. Being unable to articulate his thoughts precisely, the youngster will often say in a paragraph what he could have said in a single sentence. In addition, the clinician will often note that words of general reference to objects such as "that" or "thing" will be used instead of the object's name. In older children, an examination of school work may reveal that the student makes much better scores on tasks requiring recognition skills, such as matching problems or multiple choice questions, than on recall tasks, such as traditional dictated spelling tests or fill-in-the-blank questions.

Some information regarding recall functions can be gathered by analysis of formal test results. On the WISC-R, scores on the information and picture completion subtest will often be lowered. Subtests of the ITPA which are likely to show deficits are auditory association and verbal expression. Each of the subscales requires a number of complex intellectual and experiential processes in addition to nominal retrieving ability. Significant discrepancies between WRAT scores and PIAT scores may indicate recall deficits. The recognition tasks of the PIAT will yield much higher performance scores than the recall tasks of the WRAT.

Clinical screening for problems with nominal retrieving can be done quickly and easily. In children three to six years old, requiring the naming of colors, shapes, letters, and numbers can detect problems. The six to seven year old with recall problems will have difficulty in remembering the day

and the month of his birthday, and the eight to nine year old will be unable to give his complete birthdate, including month, day and year. Weinberg, Rogers and Dietz (1975) outline a proper name interference test which is excellent for screening nominal recall problems. The child is shown a puppet or doll and told that the name of the toy is Mr._____. For the six to eight year old child, monosyllabic names such as *Cox*, *Cone*, or *Gluck* are used. In children above eight years old polysyllabic names are used such as *Silverstein*, *Hamilton*, or *Murray*. After the child has repeated the toy's name several times, the puppet is removed and the child is asked to work some arithmetic problems in his head and to talk about what he will do during the day. After the five minute interference, the toy is brought back and the child is asked to tell the name of the doll. Children with nominal retrieving deficits will be unable to recall the name. However, if given three choices, one being the correct name, the child will recognize the name of the toy.

Memory for Series or Sequence. Sequential memory involves correct ordering of visual and/or auditory stimuli from memory. The adult will most often encounter sequencing tasks in remembering telephone numbers or in following multiple step directions to locate a particular place. Children will show problems in performing complex tasks which require a series of steps to complete. Such tasks as cleaning up their rooms, setting the table or doing homework will be difficult for younger children with disorders of sequential memory. In addition, multiple assignments of directions such as, "Brush your teeth, comb your hair, and then take out the trash," will be difficult to complete. The child may complete one, perhaps two, of the tasks and then will wander off to other activities. Parents often report that their children are unreliable, irresponsible, require constant supervision, and are unable to work independently. In reality, the youngsters are unable to remember the series of instructions and cannot carry out the assigned sequence even when they wish to please their parents.

Deficits in memory for series and sequence will disrupt a number of secondary language symbol skills. Transposition errors ("excat" for "exact") often cause deficits in spelling and reading. Children may confuse words with the same letters but different orders such as "no" and "on," "not" and "ton," or "are" and "ear."

A subscale analysis of the WISC-R and the ITPA can also provide important information regarding sequential memory. The most sensitive test on the WISC-R for auditory sequential memory is digit span. This is a supplementary test but should always be administered. It is important to

note if errors occur with a straightforward recall of the numbers, reflecting problems of auditory processing, short term memory, or anxiety, or if errors are a result of incorrect ordering of the dictated numbers. Picture arrangement and coding are also considered sequencing tasks (Symmes 1972) and may or may not reflect sequential memory deficits. In my clinical experience, I have found these two subtests not to be particularly sensitive to mild sequencing problems. Picture arrangement requires social intelligence and planning as well as sequential ability, and the coding is compounded by requiring sustained attention, fine motor dexterity, and psychomotor speed. The child with deficits in memory of series and sequence will often show lower scores in the arithmetic subtest of the WISC-R, particularly in the more advanced problems that require series of mental calculations to complete. On the ITPA, the visual sequential memory and the auditory sequential memory subtests are important to consider.

In writing for physicians, Weinberg, Rogers, and Dietz (1975) suggest a number of simple sequential memory screening tests. The four to five year old may be asked to count forward from zero to ten, and the five to six year old asked to count backward from ten to zero. Between five-and-one-half to six-and-one-half years of age, the average child can repeat the letters of the alphabet in the correct order, while the child seven and above should be able to write the alphabet correctly. The days of the week can be repeated forward by five-and-one-half to six-and-one-half years of age and backwards in the seven to eight year range. It is appropriate to ask a child of eight to nine years of age to tell the months of the year forward, and the nine to eleven year old child should be able to give the months backwards.

Cognitive Integrity. While most youngsters with specific learning disorders make normal psychological adjustments to life, some of the children have more involved neurological and functional deficits which can interfere with basic thinking processes and personality structure. These children often have major primary language dysfunctions which can disrupt auditory processing, internal associative language and speech production. This type of child is dysphasic, and the disorder may be so pervasive as to disrupt the child's language at a deep structural level.

Clinically, the learning-disabled youngster with dysphasia will have breakdowns in auditory processing which may show themselves in misunderstanding instructions or in misconstruing the examiner's words for similar sounding words. Problems with articulation of speech sounds are common. The child will often express an idea in strange ways which reflect basic language structure disorders. For example, a bright, dysphasic

youngster recently attempted to explain his placement in a residential psychiatric setting by saying, "I was sent here to grow me up." The basic meaning can be understood although the speech has a strange, confused quality. The learning-disabled child with developmental dysphasia must rely on a faulty language system as he seeks to conceptualize and understand the world. Since ego structure, reasoning abilities, and judgement are largely based upon language, the ability for rational, logical thought and comprehension is disrupted to the extent that internal language deviates from normal. The youngster may develop borderline or schizoid personality structures and be eventually diagnosed as having a thought disorder. Parents will state that dysphasic children often fail to understand the reasons for their behaviors and choose to express themselves in actions rather than words.

A number of tests can be used to identify the child with auditory and cognitive disorders. The Rorschach Inkblot Test and the Thematic Apperception Test are quite sensitive to reasoning and perceptual-associational deficits. In the typical psychoeducational test battery, the dysphasic child, in contrast with the typical learning-disabled child, will show deficits on the Peabody Picture Vocabulary Test. Subtests of the WISC-R which are usually high including comprehension, similarities, vocabulary, and picture arrangement will show deficits. On the ITPA, children who have cognitive associational problems will have lower than normal scores on auditory reception, auditory vocal association, visual motor association, and manual expression. In addition to the ITPA, several special tests, including the Wepman Test of Auditory Discrimination, the Goldman-Fristoe-Woodcock Test of Auditory Discrimination, the Zimmerman Language Test, and the Goldman-Fristoe-Woodcock Auditory Skills Test Battery, may be given to assess language functioning.

Special mention should be made of deficits in intermodal transfer which often occurs in learning-disabled children whether or not they have cognitive disorders. We have found the Lindamood Test of Auditory Conceptualization a valuable test in detecting breakdowns in transferring learning from one sensory modality to another. The Lindamood Test requires the child to make simple visual-symbolic representations of auditory stimuli and thus transfer information from the auditory to the visual modality. This is a skill that underlies phonics approaches to reading, and the level of functioning on this task is highly correlated with reading and spelling disorders.

Conclusion

The diagnosis of specific learning disorders is a complex undertaking that requires the examination of a number of psychological dimensions. The "learning disabilities" label has often been abused and is frequently used to explain a wide range of school and behavior problems with little understanding of the criteria necessary for differential diagnosis. A complete evaluation for learning disabilities must assess cultural, structural, and emotional variables as well as intellectual functioning and academic achievement. Examination of the functional integrity of the various perceptual processes, including visual, auditory and kinesthetic modalities, is necessary. The clinician must establish that a delay in achievement does actually exist and that poor school performance is not a result of poor motivation or an unwillingness to demonstrate acquired skills. If a significant delay is found in the acquisition of secondary language symbol skills, then the examiner is pressed to determine which specific psychological, perceptual-associational, memory, or motor deficits are responsible for the learning disorder.

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Developmental Dyslexia in Adolescents: The Emotional Carnage

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Suicide is shocking to those who know the victim and devastating to those who love him. When the victim is an adolescent boy or girl, the emotional repercussions are especially pronounced. The case of 15-year-old Robin Jones, reported in this issue of the *Bulletin of the Orton Society*, was first published in *The Canadian*,[1] a weekend magazine supplement to many leading Canadian newspapers. Written by the boy's mother, the tragic story of Robin's "struggle unto death" with his dyslexia brought thousands of letters and telephone calls from all across Canada. Many parents wrote to describe the plight of their own teenage dyslexic youngster, expressing fear of a similar tragedy. Worried parents deluged schools with requests and demands that something be done for children with reading disabilities.

One remedial reading teacher tearfully informed the principal of her school that "we aren't helping these kids with what we are doing; we have to learn *how* to help them. What we are doing now is making many of them worse, and some kids are being destroyed."

In some ways, equally tragic as suicide in a dyslexic is the ominous destruction of hope, of joy, of meaning, and of satisfaction in life for those still alive. The price of abject failure is high. The cruelty of underachievement viciously drains the very essence of being from children mournfully trudging along to their unchosen tragic fates. These youngsters are the walking wounded, even the living dead.

When faced with the emotional and educational complexities of the dyslexia syndrome, dynamically oriented psychiatrists sometimes feel that they are seeing psychiatry upside-down. The variety of emotional problems caused by untreated or inadequately treated dyslexia often presents a bewilderingly complex clinical picture, one not described in the textbooks of psychiatry. Dyslexic youngsters not only rotate letters and reverse words,

[1]Superscript numbers in this article refer to the numbered references at the end of the article.

but also the many problems they present tend to rotate people, including themselves, their parents, teachers, doctors, and psychologists.

With an estimated 11 million dyslexics in North America, the projected figures for the number of emotional cripples being produced by this problem is indeed alarming. Using the World Federation of Neurology definition of dyslexia[2] as a point of reference, about 10 percent of children have dyslexia to some degree. Four out of five are boys.

Emotional Implications of Untreated Language Disabilities

Research has unearthed some sobering facts about the emotional implications of the high rate of language disabilities:

1. Eighty percent of adolescents appearing in juvenile court have severe reading disabilities.
2. Nearly 100 percent of school dropouts have severe reading problems.
3. Thirty to 50 percent of children and adolescents referred to psychiatric clinics have reading disability as their primary problem.[3,4]
4. Leon Eisenberg, M.D., Professor of Psychiatry at Harvard University, has had an active interest in developmental language problems for years and has written extensively for professional journals and books. At the World Congress on Dyslexia at the Mayo Clinic in 1974 he stated: "Every poor reader is at risk for psychological disturbance, almost always as one result of, rarely as the cause of, and frequently as a further contribution to the poor reading. Let me repeat: every poor reader has psychological problems, although not all to the same degree or in the same kind." He went on to say, "The inevitability of psychiatric disturbance in poor readers stems from the pivotal role of success at school for the self-concept of the child. Schooling is, in the first instance, reading. Not only is this the major demand on the child in the early grades, but it is the fulcrum for the rest of his learning . . . . In the school environment reading is being."[5]
5. Lauretta Bender, M.D., former Director of Child and Adolescent Inpatient Services at Bellevue Hospital in New York City, recently reported[6] her survey of 5,000 boys who had been admitted to her inpatient service over a period of 20 years. She reported that of those boys under the age of 12, 50 percent had severe reading disabilities. Of those aged 12-17, 75 percent had severe reading disabilities.

Clearly, this is an epidemic of dyslexia with a serious morbidity rate. Where then are the "microbe hunters?" Where are the major fund-raising drives for research? There is not even a "March of Pennies" comparable to the March of Dimes which used to exist for poliomyelitis which was a much less widespread problem.

It is of utmost importance that every medical professional evaluating a child or adolescent inquire about the child's academic and social adjustment in school. Many physicians fail to include this essential aspect of the child's developmental history. Far too many undiagnosed dyslexics are suffering from the consequences. Medical schools must be made aware of the significance of this problem and teach the future doctors how to diagnose the problem and what to do about it.

The following case reports demonstrate some of the serious emotional problems resulting from undiagnosed or untreated dyslexia.

Illustrative Case Studies

Brenda

Brenda, now 25 years old, vividly recalls her long and painful struggle with dyslexia. Confused and bewildered by her escalating problems throughout elementary school, she became increasingly shy and withdrawn. She dreaded being called on in class and her written work was a constant source of embarrassment and humiliation when it was returned with lots of red ink and negative comments, together with suggestions that she try harder.

I first saw Brenda when she was attending university for her third year but classified as a second-year student. Hesitantly she described the agony she suffered in her determined efforts to acquire an education. Whenever faced with having to write an essay or an examination, she experienced almost unbearable tension and anxiety. Sleepless nights and agitated days plagued her for weeks in advance. Each sentence she wrote for an essay literally required hours of tortured effort. Her spelling was so poor that she had great difficulty in using a dictionary.

For many months prior to her first appointment with me, Brenda suffered such severe and persistent abdominal pains that, after repeated physical examinations and X-rays studies failed to reveal the cause, she had an exploratory laparatomy. The operation did not reveal the cause of her pains so that she was still without a diagnosis, but now had a long midline

abdominal scar, yet another source of embarrassment to her. It was at this point that she was referred to me for psychiatric evaluation.

Examination revealed the classical findings of specific developmental dyslexia with marked problems in both expressive and receptive language. She could barely read and spell at an early grade-six level and had only a rudimentary knowledge of phonics. She was found to have superior intelligence. Psychiatrically she presented marked developmental personality problems with severe anxiety and somatization reactions. She was a highly sensitive, intuitive, and creative person, but her self-image was badly shattered. Abdominal pains still persisted and often were accompanied by severe headaches. She also experienced periods of severe depression with suicidal thoughts. There was nothing in the family history to account for her emotional problems and it appeared quite clear to me that these emotional difficulties were secondary to her chronic and severe dyslexia.

So much ego damage had occurred that three years of psychoanalytically oriented psychotherapy was required in addition to her receiving intensive Orton-Gillingham remedial therapy on a one-to-one basis. Her high level of intelligence, her strong motivation, and good underlying ego strengths enabled her to involve herself in the combined therapeutic effort. Early in her psychotherapy she was greatly pre-occupied with suicide and made one unsuccessful attempt. Fortunately, Brenda's story finally ended as a success story. She graduated from university on schedule and from psychotherapy a year later. After working as a therapeutic tutor for a year she has returned to university for post-graduate work. No longer is she terrified by having to write an essay or by facing an examination. Her abdominal pains and headaches have disappeared.

John

Already a school dropout at age 13, John was also labelled delinquent as the result of car theft. Table I reveals his intellectual functioning at the time of initial evaluation.

Note the characteristic difference between Verbal I.Q. and Performance I.Q. and the marked sub-test scatter on the WISC-R. Analysis of the scatter indicated that emotional factors and his severe language disability were combining to interfere with his intellectual functioning. The combination of low arithmetic reasoning, low Block Design and low Coding scores strongly suggested dyscalculia and this diagnosis was in fact made.

Table II presents some of the achievement test scores at the time of evaluation.

Table I

PPVT: I.Q. 93 34th percentile

WISC-R: Verbal I.Q. 82
Performance I.Q. 103
Full Scale I.Q. 91

Verbal		*Performance*	
Information	8	Picture Completion	11
Comprehension	2	Picture Arrangement	14
Arithmetic	6	Block Design	7
Similarities	11	Object Assembly	12
Vocabulary	9	Coding	8

Table II

Reading	WRAT	1.7 grade	.9 percentile
	IOTA	1.0 grade	
	Gray's Oral	unable to score	
	Informal (basic reader):	unable to read from a primer	
Spelling	(See Figure 1.)		
Arithmetic	WRAT	3.9 grade	5th percentile

It is clear that this boy was a total illiterate, unable to read, spell, or write, and that he had no knowledge of phonics. All of the characteristic features of developmental dyslexia were present.

Figure 2 presents his Draw-A-Person test revealing his poor self-image, poor spatial concepts, blank eyes and absent ears and other lack of detail which are characteristic of drawings done by older dyslexics who have not received help.

This boy was a handsome, healthy youngster full of deep-seated resentment, anger, and frustration. He hated school and had, in fact, suffered considerable lack of understanding and psychological cruelty at the hands of several teachers. He had always been perceived as lazy, stupid,

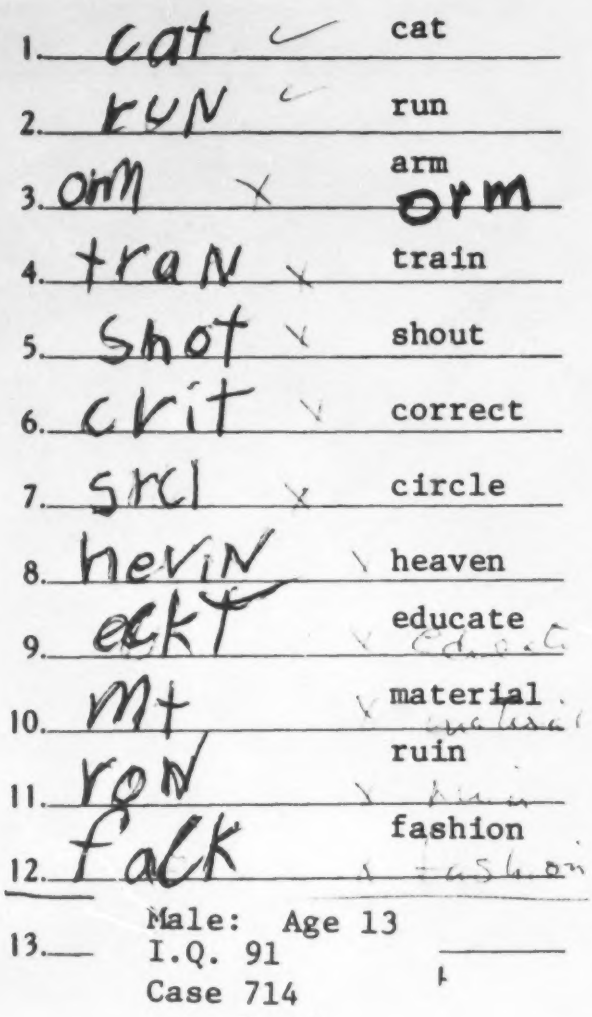

Figure 1

and a trouble-maker. No attempt had been made by anyone to provide remedial help for him.

Urgent letters were written to the school, to the juvenile court, and to the Provincial government stating that this was truly a crisis situation, and recommending the type of help he should have. Unfortunately, the recommendations were not followed.

Male: Age 13
I.Q. 91 Sp. Class
Case 714

Figure 2

Two years later he was referred to me again, now with six charges of car theft and six charges of breaking and entering against him. He told of the various gimmicky programs which had been "tried," none in keeping with my recommendations. One "treatment" provided for a period of time was to have a male child-care worker spend the day with him taking him to parks, playing games with him, and generally entertaining him just to keep him occupied. He was assigned for a while to one remedial program that provided a mixture of whole word and language experience. The boy stated it well in describing that remedial program, "I knew more about it than they did." The ending is unhappy in this case. He has made two suicide attempts, one by attempting to hang himself while in jail. Nothing is being done for him and he appears to be a lost human being.

Ann

Ann's Draw-A-Person (Figure 3) and the caption under it tell us a good deal. Figure 4 reveals her attempt to copy the typewritten sentence from the chalk board.

It is clear that this 17-year old young woman, in grade 11, presented some of the major characteristics of developmental dyslexia. Her sequencing problem is the most dramatic I have ever seen and this includes several thousand cases. Her Verbal I.Q. is higher than her Performance I.Q., whereas with the majority of dyslexics the opposite is true. In this instance emotional factors secondary to her dyslexia are distorting her Performance

I don't like to draw *

"I DON'T LIKE TO DRAW".
Patient: Female, C.A.: 17.1
WAIS: V., 103; P. 89, F.S., 97.
Case: C-77

Figure 3

COPIED: (FROM THE CHALKBOARD): HE SAW NO GIRL ON TOP OF THE BIG OVERWHELMING MOUNTAIN SEEN FROM BELOW THE RIVER.
Patient: Female; C.A.: 17.1
WAIS: V., 103; P. 89; F.S., 97
Case: C-77

He was a girls no top fo teh big overwhelming mountain seen fam belwo teh river.

Figure 4

scale scores. There was no evidence of neurological damage. She is a very healthy, well-coordinated young woman who worked successfully as a lifeguard each summer.

When Ann was in junior secondary school she was expelled twice for acting-out behavior. Incredibly, no one made the diagnosis of dyslexia. Instead she was perceived as dumb, uncooperative, lazy, and a trouble-maker.

She quit school for a while, but returned determined somehow to get an education. When I saw her, she was in grade 11 on an academic program. She was reading and spelling at a beginning grade-3 level and had no knowledge of phonics. Her arithmetic was at a grade-6 level. All of the characteristic findings of developmental dyslexia were present with severe problems in expressive and receptive language. She expressed dismay at the continued lack of understanding and at the absence of help from the school. "They see me as being stupid, hopeless, or both. They act like I am there to cause problems for them."

A comprehensive report was written and, at her request, a copy sent to the school. The school personnel ignored the report and continued actually to harrass her. Private tutoring was beyond the financial means of the family at the time. However, Ann heard about a successful program in another school district and was able to talk them into enrolling her. At last she is receiving appropriate help and she likes school for the first time in her life. It looks as though she will now be able to complete grade 12, which is her present goal.

Edward

When appropriate remedial therapy is provided, many adolescents respond well, sometimes even dramatically. An example is Edward who was

first seen in May of 1971 at age 16 at which time he had just dropped out of school in tenth grade. His parents agreed with him that he was wasting his time in school and just occupying a seat. He simply couldn't do the required work. Despite his I.Q. of 121 on the WAIS, he was reading and spelling only at an early grade-5 level. The Draw-A-Person test (Figure 5) reveals the emptiness he felt inside and the very poor self-image (poorly defined borders). He felt faceless and empty, as reflected in the drawing.

May 12 1971

Key Code B

Figure 5

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He presented the history and findings typical of developmental dyslexia. Intensive individual Orton-Gillingham remedial therapy was started immediately. Being highly motivated, he worked hard through the summer and decided to return to school in the fall, continuing his remedial therapy. In October he was enthusiastic about his remarkable progress, reading at the grade 9 level and spelling at a solid grade 6 level. His Draw-A-Person (Figure 6) reflects the change in his self-image.

Picture of someone reading while being drawn

Oct. 1 1971

Figure 6

This young man has since completed secondary school and graduated with above average grades from a university in 1977. His supportive, understanding family[7] was an important force in enabling him to avoid total defeat as the result of the ten years he suffered with dyslexia before the diagnosis was made.

Unique Features of Adolescents with Academic Problems

Certain unique qualities help in establishing criteria for differential diagnosis of adolescents having academic difficulties. There is no foolproof scheme and differential diagnosis can be very difficult.

1. *Chronic Dyslexia.* Most learning problems in adolescents result from long-standing language disabilities which have plagued the child from the beginning of school. Some of the milder cases may not be visible until the child reaches even grade 5 or 6 when there is more demand for volume reading and writing. Obviously the youth who requires three or four times as much time to complete a reading assignment is disadvantaged. Mild dyslexia may cause severe problems at higher grade levels, even in an adolescent of superior intelligence, as in the case of Brenda.

2. *The Mini-Effort Group.* Many bright children have managed well in the primary grades where minimal effort produced adequate or even above-average grades. However, in junior secondary or secondary school they are unable to produce the sustained effort necessary to succeed. Some are rather narcissistic youngsters who have gotten what they want with little or no effort and now feel put upon because they are asked to produce.

3. *The Over-Indulged.* Another group of bright children have been brought up in an overpermissive environment where they never had to postpone gratification. When confronted with the necessity to endure the tension of working toward mastering knowledge they become impatient, discouraged, or anxious. Not infrequently these children give up and turn their attention to activities in which they can secure immediate gratification. They may feign contempt for their fellow students who are achieving well. Some turn to such providers of quick but temporary gratification as drugs, alcohol, and sex.

4. *The Can't Lose Group.* Another group of rather immature children withdraw from scholastic endeavor because they can't bear to have their performance compare unfavorably with someone else's. By not doing the work, they can tell themselves and others, "If I bothered to study I could do well." These children often learn without difficulty when tutored privately, responding to the supportive reassurance provided by the tutor. It's as though the adolescent says: "To my tutor I am the most important one."

5. *The Afraid-to-be-Curious.* Adolescents whose natural childhood curiosity was repressed are prone to develop learning difficulties in sensitive areas. For example, subjects such as biology and science may threaten the youngster who is struggling against the emergence of repressed childhood curiosity about sex.

6. *The Emotionally Traumatized.* The fact that a youth can be so disturbed by traumatic occurrences at home that he is unable to concentrate seems almost too obvious to mention. The student who has been doing well in school and whose performance suddenly drops is usually caught up in an acute emotional crisis, often home-centered. Young people caught up in teenage romances with the associated crises may suffer temporary disturbances in academic performance. These young people sometimes come to the doctor because of concern over sudden inability to achieve in school.

7. *The Love-to-be-Loved Group.* Some emotionally deprived children who suddenly find themselves attractive in adolescence derive so much gratification from dates, admiration, and physical contact—from feeling attractive and lovable for the first time in their lives—that they cannot combine these experiences with less gratifying academic experiences, so that their scholastic achievement suffers.

8. *The Psychiatrically Ill.* A small percentage of adolescents with severe, specific emotional illness or personality disturbance may suffer language disabilities. Difficulty in handling aggression with excessive guilt and anxiety over hostile, destructive, or sadistic impulses and fantasies is a common finding. Although this group constitutes no more than two percent of the learning disabled, it is important to identify the problem when it exists.

The Role of Psychotherapy.

In my experience the first priority in a treatment program for most dyslexic youngsters is to provide them with expert remedial therapy. The role of psychotherapy for adolescents can be divided into three categories, although the function of the therapist may shift from one emphasis to another during the course of treatment.

I. Supportive Psychotherapy:
   A. For the adolescent. This may occur before, during, or after remedial therapy.
   B. For the parents. The therapist helps the parents to avoid scapegoating the adolescent and also to avoid being over-protective. Many parents suffer from guilt feelings and need assistance in working through this problem.

C. For the tutor. Tutors sometimes become discouraged by slow progress or are uncertain as to how to cope with a difficult parent or teacher or (not infrequently) a manipulative adolescent.

II. Psychotherapy During the Transitional Phases of Remedial Therapy:

A. To help the adolescent in making the transition from a failure complex to being able to accept the responsibility for success. Also the young person may need help in learning to adjust to new attitudes on the part of parents, teachers, and peers.

B. To assist the parents to deal with their anxieties about the adolescent's slow progress, the cost of tutoring, and the attitudes of an occasional uncooperative teacher or insensitive adult.

C. To provide supportive guidance and therapy in situations where a change of schools is necessary or where a temporary removal from school is indicated.

III. Primary Psychotherapy:

This involves the treatment of definitive developmental personality problems or of definitive psychoneurotic patterns of reactions. These are emotional problems which are not caused by the dyslexia, but which may be aggravated by it. Psychotherapy may have to precede remedial therapy.

Summary

"Frustration Unto Death" can also be frustration unto life, as exemplified by some of the case material reported here. Some of these young people are destined for lives of dismay, underachievement, and frustration. Some will end up in prison, in mental institutions, or dead. In some, suicide is on their schedule for a later date and often will not be assigned to being related to their dyslexia.

Although successful remediation can be achieved in many adolescents with previously untreated dyslexia, in many cases it is too late or not available. Robin Jones's story is enough proof of the fact that early identification and early intervention are the first priorities. The attempt at such identification and intervention, as exemplified by the work of de Hirsch and Jansky[8] holds the key to prevention. The know-how is in our hands. How much longer must the children wait?

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Robin's Story

Florence E. Jones

The events of that February evening are seared into my memory with sickening clarity. As we were dozing off to sleep, the sound of a gunshot sent my husband out to investigate. A moment later I heard his scream. He had found the shattered body of our only son, felled by his own finger on the trigger of a high-powered rifle. Our handsome, sensitive, intelligent boy was dead.

Days and weeks and months of anguish followed as we tried to piece together the reason for Robin's desperate action. We had known that he had been growing increasingly unhappy and frustrated over his failure to achieve in school. But we had not known that he had reached the point of such despair. Only now did we begin to recognize that some of his remarks and behavior during the last few months of his life had been warning signals.

There had been his statements that he was "dumb" and a disappointment to everyone, a failure in everything he tried to do. There had been his frequent retreats to the isolation of a log cabin that he was building in the woods and his unpredictable outbursts of temper. We had been concerned but also frustrated and at a loss as to where to turn. For years we had searched for some explanation of his poor scholastic output and had run the gamut of appeals to teachers, counsellors and psychiatrists.

As we continued to search through our minds and feelings to find out why Robin had been driven to take his life, memories of our earlier hopes and dreams for this boy came back to us. Robin, the youngest of our family of six normal, bright youngsters, had been born almost sixteen years before. We recalled the pleasure with which we had watched him develop from babyhood into a bright, happy, alert little boy. His inquisitive mind was forever busy and we were always surprised by his memory for almost

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The story of Robin was reported in an article entitled "Frustration unto Death" that was written by Mrs. Jones and that appeared in the September 17, 1977, issue of *The Canadian*, Canada's largest circulation magazine, which appears as a newspaper supplement in many Canadian papers. The article produced a tremendous response from parents and educators throughout Canada. Mrs. Jones wrote this article, entitled "Robin's Story," especially for the *Bulletin of the Orton Society*.

everything he saw or heard. He developed an extensive vocabulary and expressed himself with fluency. There was reason to expect good achievement from him in school.

But we were soon to be disappointed. First grade report card comments were: *Robin is not progressing satisfactorily in printing and reading. His seat-work is untidy and seldom completed in class time. Robin has difficulty reading what the words actually say. He continues to progress with the slowest group.* His final report card for the term recommended that he repeat the first grade, "thereby preparing himself for success in grade two."

We were dismayed. In our opinion, he was of higher than average intelligence. Indeed, this was confirmed years later when I finally obtained permission to see his school records. At the time that his teacher was recommending that Robin repeat grade one, a scholastic aptitude assessment showed an IQ rating of 143. Still, we were only at the beginning of our long road of dismay and disillusionment.

In response to our repeated inquiries to teachers and school counsellors, we were told that Robin suffered a "maturation lag" which would rectify itself in time. We were told variously that Robin was careless, lazy, inattentive, or spoiled. He was constantly admonished to try harder, to apply himself, to do extra drill work. Throughout Robin's ten and one-half years in school, his report cards contained one theme: knowledge of subject matter was above average; Robin expressed himself very well verbally; but his handwriting, spelling and incomplete assignments in all subjects handicapped his marks.

As we continued to search through our memories of the past, seeking the reason for Robin's death, we recalled our concern over his nail-biting and enuresis when he was about nine or ten years old. At that time, we also became aware that he was experiencing difficulty in socializing well with his peers. We sought help and finally we were able to get a referral to a psychiatrist for him.

The psychiatrist told us that he felt that the boy was "female-dominated" and needed to spend more time with his father. He diagnosed Robin as an "incipient schizophrenic" and, if the extra attention from his father failed to solve the problem, he proposed to medicate Robin with mellaril or stelazine. Two years after Robin's death, I learned that the psychiatrist's report to the family doctor had made a casual mention of a "perceptual problem" which, apparently, had been considered irrelevant since it had not been investigated further.

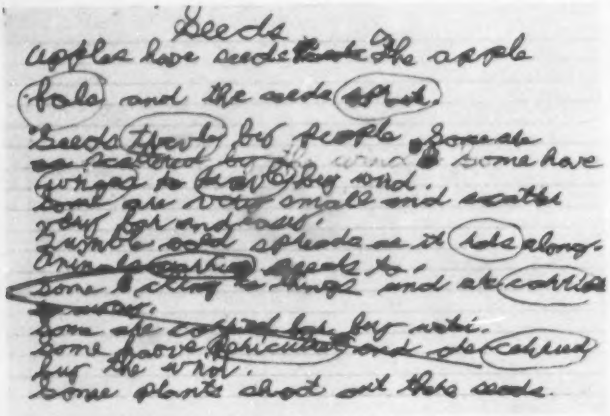


Figure 1. Report written by Robin in Grade Five.

With entrance to Junior Secondary School, Robin's difficulty increased. The greater load of written work heightened his problems in expressing himself effectively in written form. Our appeals for some explanation and for help produced only further frustration. We received evasions and even occasional inanities, such as, "Throw out his ball point pen and get him a fountain pen." The onus was always placed on Robin to "buckle down" and apply himself and on us to see that he complied.

We also recalled how optimistic we had been in our hope for an improved situation the year that we moved to the Vancouver area. We had expected to find better facilities and more qualified resource people than there were in the small town where we had been living. As soon as Robin entered the new school, I informed the school counsellor of the problems he had been encountering. The hoped-for help, however, was not forthcoming. Instead, his teachers complained of poorly written or incomplete assignments, and the school office telephoned to say that he was playing truant for days at a time.

Robin began to complain of recurring headaches and of nausea before school in the morning. An ophthalmologist adjusted his prescription, but the health problems persisted. He was then referred to a psychiatrist with whom he had regular consultations over a five-month period. The psychia-

trist gave us no diagnostic report or proposed treatment plan. When I did inquire, I was told only that Robin was an exceptional lad, with tremendous potential, and that he was beginning to resolve his emotional conflicts.

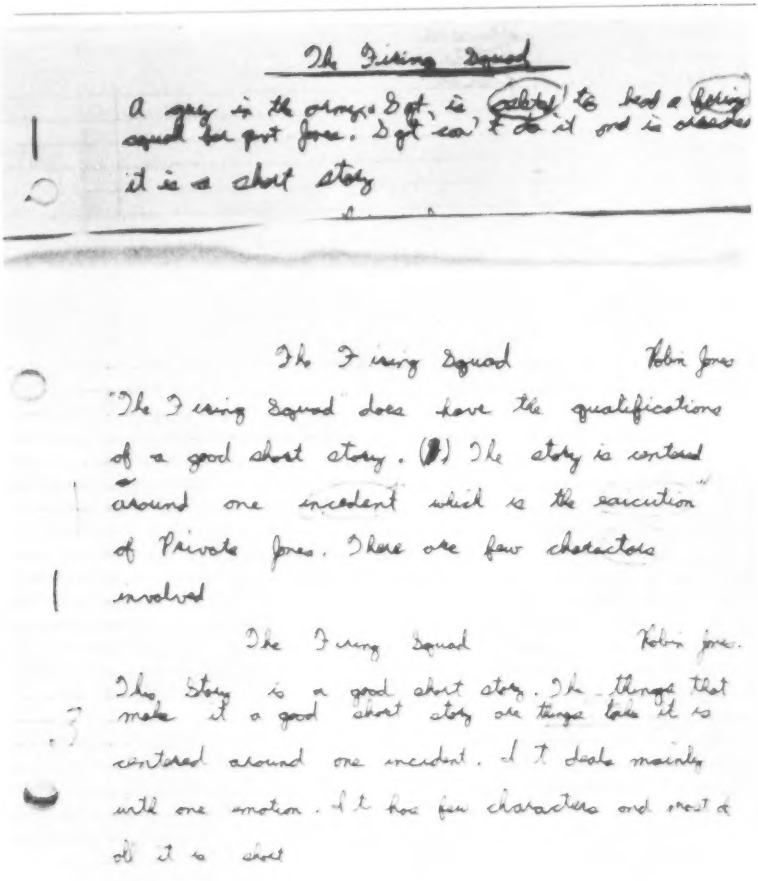
Once more, it was not until after Robin's death that I learned more of a psychiatrist's diagnosis. This time, the doctor had diagnosed the boy as dysgraphic and had recommended to Robin's school that as much written work as possible should be eliminated and that verbal testing should be used, but such information had not been given to us at the time, or to Robin, by the psychiatrist or by the family doctor or by the school. We knew only that there had been some improvement in his school work and general attitude.

That summer, we returned to our previous home in the interior of British Columbia. Robin registered for grade ten classes in the fall but expressed his reluctance to return to the classroom situation. It was only after considerable persuasion from us that he remained on the Academic-Technical program. Before long, he was once again coming home from school feeling humiliated and frustrated.

Robin wanted to succeed and he was anxious, even hungry, for approval. Although his knowledge and insight into most subjects was far beyond his grade level, his still undisclosed handicap prevented him from conveying that knowledge in writing. By mid-term, he knew that he was failing in several subjects and was talking of dropping out of school. He was being admonished by his teachers, pressured by his parents, taunted and rejected by many of peers. Ignorant of the true nature of his handicap, we insisted that he remain with his studies. Our refusal to allow him to quit school must have closed the door on his last hope for escape from an untenable situation.

In May of the year that Robin died, I had occasion to be in Vancouver. On an impulse, I made an appointment to see the psychiatrist who had been treating Robin the year before. It was then that I first learned that he had diagnosed Robin as dysgraphic. The term was unfamiliar to me and he explained it as one manifestation of the specific learning disability syndrome. I was stunned that this information had never been given to Robin or to us, his parents. I was even more dismayed to learn later that not only had this psychiatrist underdiagnosed Robin but had treated him for an emotional problem only instead of attacking the cause.

I became increasingly concerned with determining what was being done for children with specific learning disabilities, especially in my home province. It was my search for information that eventually led me to



The Firing Squad

a guy in the army. I don't, is [illegible] to lead a firing squad but got fame. I don't care if he is or not and is about it is a short story

The Firing Squad Robin Jones

The Firing Squad does have the qualifications of a good short story. (B) The story is centred around one incident which is the execution of Private Jones. There are few characters involved

The Firing Squad Robin Jones.

The Story is a good short story. The things that make it a good short story are things like it is centred around one incident. It deals mainly with one emotion. It has few characters and most of all it is short

Figure 2. Three attempts by Robin, in Grade Ten, to write a report on a short story and to show what qualifies the short story as a good one.

Vancouver and the office of Carl L. Kline, M.D., C.R.C.P. (C), who had been recommended to me as one of the most knowledgeable in the field of specific learning disabilities. After several hours spent with Dr. Kline and his wife, Carolyn Lacey Kline, a psychoeducational consultant, discussing our son's case and showing them some of Robin's workbooks, they were both convinced that Robin had been thoroughly dyslexic. They felt that had Robin received early, adequated remedial help, he would have been enabled to use his fine potential creatively and constructively. In Robin's case, such help would undoubtedly have been lifesaving. He did not need to die.

I am still deeply concerned about the deplorable lack of appropriate diagnostic and remedial services available all across Canada. Teachers are not receiving training in the recognition of specific learning disabilities, and Ministers of Education are not providing sufficient government funding to ensure the provision of diagnostic and remedial services required. Only continued pressure from concerned citizens—parents and educators—can bring about a change in the current situation. Only then will the Robins of this country be given the opportunity to use their potential creatively and constructively. Only then will these children and their parents be spared the needless suffering and emotional scarring that result from undiagnosed and untreated specific learning disabilities.

Richard's Story

Richard Strauss

President, Realty Development Corporation
Dallas, Texas

When I was asked to give a speech at the annual conference of The Orton Society, I said that if I had to prepare one to read, it would take me an hour and a half to get through what would take a normal person only ten minutes. Rather than do that, I decided to tell a little bit about my life, about some of my educational experiences, and about some of the good and bad in it.

I started in public school in the first grade like most people. But by the fourth grade, my teachers called in my parents to inform them that I was totally unable to read or write and for that reason, they suggested, I should not progress into the fifth grade. At that time, my parents enrolled me at St. Mark's, a very fine private school with small classes. Even in the small classes, I was still unable to compete with the other students. I can remember that in the fourth grade there, the teacher had to write my last name on the bulletin board for me because I could not spell it.

I went to St. Mark's from the fourth grade through the eighth grade and continued to have great difficulty in competing with the rest of the students. In fact, the more difficulty I had, the more I cut up in class. I was probably the leading juvenile delinquent in St. Mark's history, and I was not asked to return for the ninth grade for disciplinary reasons. I had spent more time skipping classes than in attending classes. I would have gotten away with that except that when I skipped classes, I would go into the different classrooms and steal pens and pencils out of the desks and then sell them to other kids on campus to make a few dollars. One day on the way home on the bus, I sold back to a guy his own pen that I had stolen that day. That was the end!

In the ninth grade then, I went back to public school for another try. At the same time, I was being tutored just about every afternoon. Off and on, I was taking speed reading courses, and I was spending most of my life in

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summer school. Finally, we found a doctor who "realized" what my problem was. He suggested that I buy bifocal glasses and that would cure it all.

So, wearing bifocals, being tutored, taking my speed reading course, I was making great progress! In fact, my parents thought that I was making exceptional progress until one day when my Latin teacher (I had started Latin in the ninth grade) called them about midway through the semester and said, "Mr. and Mrs. Strauss, I'll make a deal with you. I'll pass Rick in this semester, if you will promise—in writing—that he'll never take another foreign language until he gets out of high school. This is the dumbest kid I've ever seen in my life." He said, "I've had him for nine weeks and he doesn't know one word of Latin and I'm not sure that he knows many more in English." This sounded pretty good to me at the time because it looked as though it might be the only course I was going to pass that year.

As time went on, there were still problems with my conduct, or at least my parents seemed to think so. I seemed to think I was having a lot of fun. I was out of school more than I was in. I was caught riding go-carts through the halls of the school. I did all the usual things!

Every morning, announcements would come over the loud speaker mounted high on the wall of the classroom. In my classroom, there was a bolt missing from the bottom of the mounting which would always shake a little. One day, when it snowed in Dallas, I put a snowball on top of the speaker. The teacher sat down beneath it, and as soon as the morning announcements began, down came the snowball—and out went Rick!

I finally wrapped up my high school career with my second attempt at my senior year when I took wood shop, speech, and—for the third time—Freshman English. I took those three courses and finally got out.

It was early during that senior year that my father contacted a person in New York who was supposed to be one of the leading people on learning problems in children. He suggested that I go to the Scottish Rite Hospital in Dallas to be tested for dyslexia. I did get tested and, for the first time, was made aware of exactly what my problems were. I was then tutored by Mrs. Bywaters in the Orton-Gillingham method all through my last year in high school.

Then it was time for me to try college, so I sent my applications off to ten schools thinking that I would get four or five acceptances and then pick the one I wanted to go to. When all ten rejected me, we found an organization that for $250 would enroll a student in any college or university in the United States. We paid the $250 and I received three acceptances, one

of them from a college that received a lot of publicity about 12 years ago. It was Parsons College, but when *Life* magazine did a cover story on it, *Life* called it "Flunkout USA." As long as your father was willing to pay the high tuition, you could continue to go there no matter what your grades were—and nobody had ever failed out. Well, I proved them wrong in twelve easy months!

From Parsons, I went to another school, Henderson County Junior College in Texas. There I managed to do in six months what had taken me a whole year at Parsons. After about six months there, my father took me into the sunroom one day and said, "Son, you know some kids are born students and some aren't, and you definitely fall in with the latter. Maybe we ought to try something else." So I got into the Air Force Reserves and, after a short time of active duty, was stationed near Dallas. I went back to Mrs. Bywaters and was tutored some more.

After my period of service, I went to work for a real estate brokerage firm in Dallas. At the age of 22, I opened my own real estate firm. That was ten years ago. Since that time, I have built over 5000 apartment units in four states and have managed over 10,000 units. We have done the corporate restructuring for a major American Stock company after it went through bankruptcy. The company had 900 stores and 250 million dollars in assets and liabilities. We represented another American Stock Exchange company in the acquisition of a third American Stock Exchange company which was doing $80 million a year in business and making a little over $8 million a year in profits. I am Chairman of the Board of a bank in Dallas and also chairman of the loan committee.

All of the successes I've had were possible to me for a few simple reasons. I learned that every person has strengths. For some it is in finance, being able to study financial information; for others it is being able to read well; for others it is writing well; and for others it is common sense. Every person has certain strengths. What is most important for students with dyslexia—or for adults with dyslexia—is to locate those strengths and learn how to capitalize on them and learn how to do the things that come naturally to them and not to spend their whole lives concerned about the things that are the most difficult.

Another important reason for my successes is that I was very fortunate in having understanding parents. They understood that I was trying. They understood that I could spend two hours studying for a test on which others would need to spend only fifteen minutes. The others would get an A on the test and I would get an F. My parents did not concern themselves as long as

I was applying myself and trying. The more trouble I got into, the more understanding they were. The worse I did in school, the more understanding they were. They understand that some people are born to be students and others are not born to be students. When I was having my most difficult time in high school, when I was on my third round with Freshman English, and when I couldn't pass any of the courses, I would go home at night and sit down with my father and compute the depreciation schedules on his radio station with him and do the budget for the next month. Yet, at the same time, I could not compete in my class with the kids who were fifteen and sixteen years old.

Another thing is important for people with dyslexia. At an early age, they must have explained to them what their problem is and that they are not mentally retarded, that there isn't anything that makes them much different from other kids. They have got to know what their problem is and it's got to be explained to them in a way that they can understand. There is nothing worse than not understanding—and I know because I went through it.

In my opinion, the disciplinary problems come from not being able to compete in class with others or to get the attention of other students or feel equal to them. You've got to do something else, whether it is cutting up in class or becoming the fastest runner on the track team or the best passer on the football team. If you are five feet seven and a half, as I am, with short legs, you aren't going to be a great football player or track star, so I thought cutting up was best. Had I known myself, had I not had the problem of wondering why I couldn't compete with the kids next to me, why I couldn't answer the questions they could answer, couldn't make the grades they could make, and couldn't achieve scholastically like them—had I understood all this, then I believe I would not have had so many disciplinary problems. The problem must be recognized and must be explained to children.

There is something else that I think we need and that is important. I came from a very fortunate situation in that my parents did not believe there was something mentally wrong with me. They could afford to spend the time and they cared enough to spend the time and the money and the effort—a lot of years and a lot of work—trying to find out what my problem was and why I could not read and write. Not many children in our school systems today have that opportunity. Therefore, we must give that opportunity to them. We must teach teachers in the public schools to be able, first, to recognize children with dyslexia while they are in class and, second, to teach them to read and write in that class along with the other students. If you do

that in the schools where the children are—the children who do not have the opportunities I had or the parents who understand the problem and can afford the special help—then, in my opinion, this will help children with dyslexia more than anything else that I know of. Dyslexia is real and it can be dealt with, and the most important thing a person with dyslexia can have is the understanding of the people around him.

Unblocking the Dyslexic Teen-age Reader: Paul's Gift

George Warren Hayes, M.A.

Director, Birch Hill Program
for Teen-Age Students

The encounter with Paul occurred back in my own eighth-grade year, in public school in Poughkeepsie, New York. Paul changed my life. Without him, this would not have been written; indeed, my life's work with young people might never have begun.

Back in those days, a superb New York state public school system, characterized by trained teachers and a state-wide plan of Regents examinations, assured reading competence to the average boy and girl. I lived on the edge of the tough section of town, the factory district, and School Number 2 which I attended was in an area populated by first-generation Italian, Irish, and Polish workers. Each morning at seven o'clock a factory whistle at the DeLaval Separator plant beside the Hudson River blew in the early darkness, and factory parents trudged off to work, even as their children got ready for school.

For most of these students, the American dream of a sound public education was realized as surely as their parents' dream of an American land of ease and plenty was not. Many of those boys and girls in our town, with whom I went to public school, are now competent tradespeople; one or two are physicians or lawyers; several are nurses or secretaries.

This same public school system served me well. Without the slightest interest in school on my part, it pounded home the Three R's so effectively that my homework was done in a trice, and I could turn to the machines I loved. My mother knew of my mechanical interests, but never gave me electric trains or little steam engines as toys; instead, she gave me the tools to make them. And this is how a bent, a skill, an inclination, was established which can still arouse my enthusiasm.

George Warren Hayes, former director of reading development and counseling at Northfield Mount Hermon School, founded and directed Linden Hill School in Northfield, Massachusetts, from 1961 to 1974. He and his wife, Penny, now operate the innovative Birch Hill Senior Tutorial Program, the subject of this article.

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It was in the fall of my eighth-grade year that I met Paul. In our class, I knew him only as one of the bigger, older boys who sat in the back of the room. He could not read. Public education in those days had no time for the Pauls. Busy teachers, with 40 students and Regents' requirements to meet, did what they could for such lads in after-school hours. Our teacher sought to aid Paul, but he was too far behind. Yet he disturbed no one. He would sit in the very back row, bent over his desk, drawing. His art work was by far the best in the class, and served to win the respect of other students. They somehow recognized that Paul was different, cut from another mental cloth, remote from the rest of us.

In the back garden of our home I had built a little shop, and it was there that I hurried each afternoon after school. One day, I was working on an engine for an electric boat, and was having difficulty keeping the propeller shaft housing from leaking, when over the top of the garden fence appeared Paul's head. He was a much larger lad than I, and I did not know him well. Even after recognizing him, I watched him swing over the fence and down to the ground with some concern. As he approached me in my little shop, I quickly explained my problem with the propeller shaft housing.

"I know a guy who can help," Paul offered. "Come with me down to the forge. Mr. Ames can fix that for you."

Mr. Ames was the owner of a wondrous forge and repair shop, where I used to pause en route from school to watch the flying sparks and glowing iron. "Fixing" in those days meant repair of the old part, not ordering a replacement. Mr. Ames was the man to do it, and Paul worked for him at his shop on Saturdays. So off we went to the forge, and a tight fitting was quickly made for my engine.

Thus commenced a friendship with Paul which was to broaden and enrich my eighth-grade year. This dullard who could do nothing in school became alive the moment he left it. Together we went fishing on the Hudson River, riding the great rollers from the Hudson River Day Line boats. And though I prided myself on my angling skill, Paul almost invariably caught more. He seemed to have some knack which I could not discover.

But what welded me closest to Paul was his gift with machines. He was a mechanical wizard. His mind, frustrated and blocked in the classroom, had turned away from printed symbols as a tree turns from shadows toward a patch of sky. And when he left school each afternoon, his manner changed as well. The uneasiness which pervaded his school behavior vanished, and he whistled cheerily and well.

In a dim way I knew I had never met anyone like Paul. I could not comprehend his trouble in school, and more than once I tried to help him with homework. "Look, Paul," I'd say, "it's easy if you try it this way." But

Paul would not try. He would shake his head doggedly, his face set. "School is not for me," he would say. Paul always seemed to be growing, but he was growing away from formal education.

In later years I was to spend countless hours looking for the key to Paul's difficulty, the answers to the questions he could never ask. How to reverse this trend away from books, before it becomes inalterable? How to inoculate the massively blocked reader with the germ of reading, so that self-confidence may be restored?

Experimentation in training the blocked reader at Linden Hill School in Northfield, Mass., and most recently at The Birch Hill Tutorial Program for teen-agers, leads us to believe that this is indeed possible.

Consider the state of mind of the teen-age boy or girl with reading and spelling skills far below the level of competence needed for work at that age level. There are more of these youngsters than one might think; you just don't see them around school any more, for they have quit. They are out on the highroads, perhaps with a guitar and a back-pack and a stash of dope. The FBI estimated that more than a million such dropouts and runaways had hit the road across the nation in the fall of 1977.

Those who remain near home may find local jobs, the boys pumping gas in garages, the girls working as waitresses. Often they are among the more efficient employees. The fact that they can barely read does not seem to affect their earning a living, within the narrow limits imposed by their inability to read and write. Often their sense of loneliness and inadequacy leads them to join dubious groups, or to marry and have children without any real security for the new generation.

Where did this begin, this loneliness, this sense of failure, this compensatory need for companionship, which can lead to such harsh solutions? Quite often, in school failure in the earliest grades.

At Linden Hill we always commenced classes for such despairing boys with the simplest questions we could devise—with the sole purpose of winning their attention from day-dreaming and wool-gathering. We remember a little lad suddenly starting up, eyes wide, almost shouting in protest, "Why do you ask me that? Don't you know I'm dumb?"

Sometimes, in a very sensitive child, this conditioning to failure can reach a state of physical revulsion or nausea. And if the failure response is so conditioned at age 10 or 11, then by age 14 or 15 the doors to reading have been firmly bolted. The exhortations of parents, the sympathy and encouragement of those attempting reading programs—too little and too late—these no longer bestir the mind.

Thus, by the mid-teens, the original reading block, often simple in itself, has become a monstrous mountain peak, impossible to scale. The wonderful age of 16, when the long arm of school authority may no longer reach out, is eagerly awaited.

We have dwelt at length on the cumulative effect of frustration in the teen-age blocked reader like Paul, because we believe it such an important aspect of the retraining process. These are clever young people, many of them, who can tune a motor to a whisper, or paint, or make delicate pottery. Reading is no longer their primary problem; it is the conscious and subconscious conditioning against school and learning which first must be understood and overcome. But how can one begin to establish a relaxed frame of mind, when everything from a blackboard to a book sets the student on edge?

From the earliest days of Linden Hill, Penny Hayes and I grappled with this problem. And we did make progress. Negative conditioning from previous school experience was covered over by many layers of success, particularly in soccer and track, where our lads would compete with schools many times our size and come away with their share of the winnings. We had youthful, dedicated teachers, and a workable prefect system in which an older boy was responsible for a younger.

Our plan worked fairly well in re-teaching reading, and excellently in the area of character formation. Yet we are now convinced, from recent work with our Birch Hill Program, that our early reading training could have been much more effective.

In arriving at the conviction that we know know how best to teach the massively blocked teen-ager, we have broken away from our previous more conventional thinking, and have discarded much of our inherited methodologies. Yet we feel our new approach to be psychologically sound, and, most importantly, it brings results, setting loose new currents of curiosity and imaginative energy.

We believe that our new success with these teen-agers stems in part from removal of the conditioned negativism of school associations. Since teacher and student work in a strict tutorial relationship, all the impedimenta of mass education—classroom chairs, blackboards, the odor of chalk, indeed the very classroom itself—may be whisked away as if by magic. All the many required tools, from maps to specialized reading instruments, may be tucked away and presented only as needed.

Yet it is not enough to remove the offending stimuli of the old classroom approach. A warm and positive association must replace it. We learn best

when we are eager and intense, when our imagination is fired, and especially when our hands are brought into the learning. A Frenchman has said, "*L'homme est intelligent parce qu'il a des mains.*" Certainly the control of the tongue lies in high priority with control of the thumb and forefinger in the organization of the central nervous system, as Wilder Penfield has demonstrated.

Why not begin, then, with something that the boy or girl enjoys? And what do teen-age boys enjoy? They love engines, for engines spell power. A boy whom we once taught could not read a word, but he could reel off the piston displacement of any car on the highway, American or foreign. For heaven's sake, then, let's not begin with a word, or a book, or even a phonics card. Let's begin with an engine.

We began with a 30-year-old engine for a gasoline-powered washing machine, purchased for $10. It was coated with the dust of decades, but we were assured it would run if thoroughly overhauled. Built in the days when machines were designed to be repaired, it was not difficult to disassemble. Of course, we needed the assistance of an expert mechanic who knew how to fabricate parts for old engines. Such an expert both advises and assists, building skill into the hands of the blocked reader. And the hands, excited and stimulated now as they never were in a classroom save to fidget under the desk, these hands, thumbs, fingers, are closely related to the all-important instrument of speech, the tongue.

Now one can begin to get technical about engines. There is a superb plastic model of a V-8 engine manufactured as a kit by Revell. Non-readers like to assemble models by looking at the pictures, but this model is too complicated for that. Each system—lubricating, fuel, cooling, ignition—is worked out in clear diagrams with all the vocabulary of the engine. A boy who could not learn a vocabulary list of ten words in school not only picks up these technical words without apparent study, but seems to know them next day as he tinkers away.

So now it's time, cautiously, oh so cautiously, to build a phonics system after Gillingham. It's just as easy to choose relevant key words. Instead of *apple*/*a*/, *baby*/*ā*/, and *safe*/*ā*/, why not use *cam*/*a*/, *voltage regulator*/*ā*/, and *pressure plate*/*ā*/, and with a typewriter and some colored pens, make up special phonics cards for the student? The imaginative teacher who knows Gillingham phonics thoroughly can build a system around each student's interest, be it fishing, horseback riding, or what you will. With girls, it may be well to start, for instance, with the anatomy of a horse. Teen-age girls often find their first love in horses, and progress with vocabulary and reading skills can be made by beginning with horse terminology.

Substitution of *cam /a/* or *shank /a/* for the conventional key words on the Gillingham card is of course only a teaching strategy to assist the accurate recognition and spelling of the word with the enlisting of the youngster's enthusiasm for the machine or the animal. We have come to adapt our training vocabulary to the unique constellation of positive forces that characterize the individual boy or girl. It should be stressed that this in no way releases us from the underlying principles and arduous training of the Gillingham method: the systematic sound-symbol relationship work that develops syllables and word parts consistently. This adaptation of the key word vocabulary to the individual may not appear vital, yet we are convinced that by the mid-teens, after repeated failures, it can be all-important in establishing the motivation and the resolve to try, once again, to master a printed page.

And once an old engine has throbbed to life, a boy may be so swept along by the love of his motor that he begins to view the teacher as friend and companion. So now one may begin counseling. At this stage we help the lad to review in his mind the reason that he never learned to read in the first place, and to show him that boys with much lower IQ's than his can learn to read quite well. He has demonstrated to himself with his engine (for we have praised him often) that he is quite bright, so he begins tentatively to accept this possibility.

This counseling stage has proven to be the trickiest part of the retraining. We call it "looking around a corner at your old self." Invariably we see a little boy or girl, shattered by a divorce, or sick for a month or two in Grade One. And as we view the old self in a rest period from the exhausting work of leaning over that engine or currying that horse, the student begins to listen and to understand.

"It's not the reading, primarily, Joe, that's been your trouble. It's the fear of failure in reading. You missed some stages, then you got panicky, and then the mocking laughter of your classmates did the rest. Using this little system you can work out any word you want." And so the boy is won to trying again.

But a blocked reader is like a wild pony, and putting a saddle on a wild pony—especially a pony conditioned against a saddle by abuse, as such a student has been—is slow, slow work. Those fingers must be nimbly working even as the tongue commences a new and nimble response, and the empty chambers of memory, long unused, begin to fill with a new and even technical vocabulary.

And all this time, we're reading to our engine student from boys' adventure stories. About the Indianapolis 500, and speedboat racing in Miami. And we reach a stage where we stop in the book at a nice, pure

phonic word, and let the boy do the reading. That boy, whose reading interests not long ago were totally "out to lunch," not only reads the new and unknown word, but fits it into the context in a moment. There's a reward, too, for getting this word right—perhaps points toward the purchase of an old, battered car.

Old car? Indeed, yes! That 15 or 16-year-old boy wants to drive, more than anything else. That spells control, that spells prestige, that opens the way to taking his best girl out alone to a movie or a football game. So about now we get a state driver's manual. That boy who never wanted to read will read that. We memorize it with him, every word of it. It's not written for beginning readers, and the vocabulary is difficult. So using our revised Gillingham phonics, we divide every unknown word into syllables, and teach our boy to accent the stressed syllable. We have to do this over and over again, twenty times to a word, for at first he is not even able to get the stressed syllable. But because of the image of that girl in the front seat with him, he will stick at it as he has never stuck at any reading before.

This, we have now come to believe, is one effective way to reach the Pauls and the Susans. Start with their interest, as with a stone thrown into the pool of the imagination which will make ever-widening circles.

And what of the real Paul, with whom this account opened? Well, IBM came to Poughkeepsie about that time, and at 16 years of age, freed at last, Paul went to work there. He rose rapidly at first, but always his lack of verbal skills limited his promotion. I used to see him now and again, on return home, but by this time we had little in common. Both of us served later in World War II, and Paul, a tank repairman, was killed in an air raid in North Africa.

As for me, after the war I returned to Kent School, and soon after sought the aid of Stella Center to solve the problem of a failing boy. Yet I continued to work in conventional school systems, for there was always state law to circumscribe the ideally designed program. Only recently, as herein recounted, have I broken out of the pattern.

Our work with younger children is presently constrained by laws requiring them to do a whole program of English and history and math at once, and the effort to learn the one can soon become mixed up in the other, when all a boy may need at first is phonics in a stimulating environment. Yet when a lad reaches 16, we are free to help him go the way of his own bent. To pick up and go forward with new Pauls. Indeed, even to dream of a time when from the first grade one may go a completely new way.

I now believe that the education of the child with a reading disability—only potential at first—should from the very start follow a special and individual route based on interest and ability. At no point should a

youngster experience the frustrations growing from inability to do what the average child or class can do. There *are* things that every boy, himself, can do, uniquely, unto himself. To his areas of success, to the belief that our new Paul is a tremendous fellow, we must link the foundations of reading, writing, and arithmetic.

Indeed, I will go further. We are losing boys and girls today—and this goes for the average student as well as the blocked reader—because we are losing their imaginative life. A new world is being born through cinema and television fantasy, and many of us as teachers risk being on the outside because we accept with composure our own imaginative and literary world of yesterday.

There is a new spirit abroad in this land of ours which we, as teachers, had best evaluate if we are to reach the kids in our classrooms.

Theirs is a new mythology. Gone are the classic gods that shaped our childhood thought for 2000 years—Zeus, and the sun chariot of Icarus that bestirred Greek and Roman imagination. Gone too, for our kids, are the heroes of the Middle Age, Roland and Roncesvalles, and the mighty Charlemagne. And gone with them are Thor and Wodin and Siegfried.

The other day I attended a performance of *Star Wars*. At least one-half of the matinee audience consisted of young people from 6 to 16. As I watched battles in distant galaxies, and listened to the excited shouting and clapping of the boys and girls as the good guys won, I realized that here are the new superheroes of their imagination. This is the era of *2001, A Space Odyssey*, of *Star Trek*. This is the new mythology.

A friend of mine, an excellent teacher, complained to me bitterly not long ago that it was impossible, now, to teach the English novel with its leisurely pace to boys and girls who experienced the incentive moment, rising action, climax and falling action within one hour with four minutes out for advertising breaks.

Well, let us accept the fact that the great classics of English literature are beautiful monuments of a by-gone time, as shining and wonderful as those of Ghirlandaio or Botticelli or Michelangelo, but to our kids quite as remote.

If we are to reach them, particularly the blocked ones, we must speak their language. And their language is the language of spaceships, of dominant heroines and heroes, who know judo and karate and use it on the bad guys, of incredibly vast machines and engines and power. This is the world of our children's imagination. It is here. If we wish to know them, we must know and accept it as well.

Paul would have been happy here.

Evaluation of Oral Language Disorders in Children

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Language disorders in children include a wide range of types of deficits and degrees of severity. The language disorder of a nonverbal pre-school child can interfere with his relationships to adults, to his peers, and to his environment as a whole. An adolescent whose language disorder is a word-finding problem may encounter difficulty with verbal conversation, providing oral responses in school, taking tests, and expressing himself through written language. Within this broad range of problems, certain principles of assessment and remediation remain constant. We consider the nature of the input of the tasks presented, the type of response expected, and how the input may be varied in order for the child to respond successfully and to learn (Johnson 1967). Within this framework, however, the teacher or clinician must be aware of maturational development. For example, we could evaluate the oral language of a two-year-old child, but we would not attempt to assess his facility to write a paragraph until he is about eight years of age, after exposure to written language in school.

Approaches to the Evaluation of Language Disorders

How we view *language* can determine assessment and management plans. Different evaluation procedures and different remediation will be provided if we regard language as involving syntax-morphology, semantics, and phonology; if we regard it as part of the total process of communication; if we regard it as part of the language arts continuum that includes listening, speaking, reading, and writing; or if we consider the content versus the form of the language used. If we do not ask specific questions, we

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will not have the answers to them. If we do not study a part of the child's language behavior, we cannot make a comment on it or suggest remediation.

Traditionally language, as studied by linguists and speech and language pathologists, has included syntax or grammar, semantics or meaning, and phonology or the interpretation and production of speech sounds. If we follow the traditional approach to language evaluation, standardized tests or devised clinical tasks will be used to assess understanding and expression in each of the areas. Information gained by such procedures allows for comparison of behavior before and after specific remedial approaches have been used. If one relies only on standardized tests for this language assessment, however, there may be a limitation to the information that can be acquired because of the ceiling, at early school age, on many of the test instruments.

Evaluation through Observations

Observation of Nonverbal Aspects of Communication. Additional information can be added to our evaluation of the child's language if we consider language as part of the total act of communication. We can, for example, observe the understanding and use of the nonverbal parts of the message—the pauses, inflections, and stress patterns. The adolescent who interpreted a broadcaster's weather report as telling about a "nice old lady tornado," when the report was referring to an isolated tornado, illustrates this point. If the child does not understand the difference between a statement and a question by the inflection used, he may have difficulty interpreting the periods and question marks in reading.

Observation of Communicative Intent. In regarding the whole of the communication process we may observe the individual's communicative intent. The baby, in his first year of life, begins using interactive vocal play. He may also point and use a questioning vocalization as though asking to have objects named. Some young nonverbal children demonstrate communicative intent or a desire to convey and receive information through the use of sound effects, facial expression, gesture and pantomime even though they have no words. With these children, we might begin working immediately with language comprehension and expression. Other nonverbal children of similar intelligence, however, do not show any attempt to communicate voluntarily with persons in their environment. For such children, it would be necessary to first help them establish communicative intent or a desire to share and interact with another.

Communicative intent may also be observed in an older child who wants to and does communicate verbally as opposed to the one who answers questions directed to him in a compliant manner only and with the shortest and most concrete responses possible. With an adolescent it is necessary to determine if he does not want to communicate verbally or if he has an oral language disorder which interferes with his verbal expression. Treatment approaches would, of course, differ with two such youngsters.

Observation of Content and Form. Another kind of information is gained if we consider language as part of the language arts continuum. We would then evaluate comprehension and expression of oral language, reading, and the written language. Even if we are not trained to assess reading and writing the language, we may form hypotheses about how a problem with oral language might affect reading and writing or, in contrast, how good oral language skills might assist the child in mastering reading and writing. The individual with deficits in oral language comprehension is likely to have similar problems with reading comprehension. A disorder in oral formulation of sentences and paragraphs may affect written language production. Helping the child with good oral language to make conscious use of his semantic and syntactic knowledge may aid him in reading. He may also benefit from specific activities to help him produce a closer match between what he says and what he writes.

The content and the form of the child's language responses can be studied. Some children demonstrate correct structure or grammar but the content may be empty. The sentence, "You know! it's a thing used to do all that stuff when you're working," may be grammatically correct but does not let us know that the child is talking about a hammer. Other children may demonstrate good knowledge of vocabulary and concepts and may score well on verbal intelligence tests but have difficulty with retrieving information and formulating a response. For example, a seven-year-old child who scored within the bright normal range on verbal intelligence tests observed me as I placed materials in a carrying case and said, "I got a suitcase—a white one. My brother—you know a purse—that's big—mine is like my dad's suitcase and he also has a brown one—but a briefcase—my—has—has two suitcases which—sometimes we don't bring my dad's—we only bring mine." He had a number of concepts, suitcase, purse, briefcase, but difficulty with retrieving the specific word that he wanted to use and with organizing a well formulated response.

In evaluating a child's oral language we may include each of the above observations. Used in combination more data may be gathered to implement an instructional program.

Response Behavior

It is helpful in analyzing a testing or teaching task to consider the types of responses a child provides. One way of classifying responses is as follows:

Reflex
Imitation
Recognition
Recall
Application
Self generation

An example of a reflex response observed in early life is when a baby startles to a loud sound. We are all aware of reflex responses such as an eye-blink when something comes in front of our eyes unexpectedly or when we withdraw our hand from a source of pain.

Imitation is observed in the baby when he begins imitating his own vocal play, as he begins to imitate vocalizations in an interactive way with the caregiver, and when in the second year of life he demonstrates deferred imitation by pretending to carry out an activity he has seen. Imitation responses are observed in tasks requiring repetition of a sentence or copying a design or letter after watching the teacher.

A recognition response occurs when a child recognizes a word that he hears by pointing to a picture or an object, recognizes that a word in a group of words is misspelled even when he cannot correct the spelling, or recognizes and points to the correct letter when he hears the sound although he cannot retrieve and say the sound from seeing the printed letter.

Recall responses are seen when a child can retrieve and recall a word that he wants to say, reads a word, or spells a word from dictation. When children have language problems we must determine if there is a difference between recognition and recall. The child indicates a different kind of problem if he hears a word and can select, or recognize, a picture without being able to say the word than if he hears a word and cannot select an appropriate object or picture. The first instance suggests an expressive language problem while the second indicates a receptive language problem or deficit in comprehension.

Application responses occur when the child can apply learned information to a new situation. If a young child can pick up a ball when he hears the name and can say "ball" when he sees a picture, he demonstrates application or knowledge of his experiences. He demonstrates knowing and applying the meaning of the word *behind* if he can respond to the

preposition in various contexts as, for example, putting his hand behind him, standing behind a child in line, putting a toy behind a chair, and recognizing a two-dimensional picture or drawing of a boy standing behind a tree. To demonstrate knowing the words *before* and *after*, the child applies these words to temporal and spatial events. He knows which day comes before or after a given day, when a sound is before or after a sound in a word that he hears, and when a letter is before or after a specified letter in print.

A behavior that we are always working toward in remediation is for the child to provide a self-generated response. This could be his spontaneous use of a word or sentence, telling about an important event, drawing a picture, or writing a creative paragraph or story.

Another way of classifying responses might be as:

Nonverbal
Auditory motor
Visual motor

A nonverbal response could be pointing, manipulating objects, gesturing, using pantomime, or providing a gross motor response such as walking across a room on command. An auditory motor response would include a sound or sound effect, a word, a sentence, or a paragraph produced orally. Visual motor responses may be making a mark with a pencil, writing a letter, word, sentence, paragraph, or composition. Structuring tasks so that the child can indicate his comprehension of language without speaking is important and has implications for remediation. A child can demonstrate comprehension of language without speaking. There may be times when a child is excessively verbal so that his verbalizations interfere with comprehension. He may be echolalic or use only self-initiated language without responding to the verbal input or questions of another in an interactive way. For part of a language lesson the teacher or clinician may want to discourage verbal responses and require the child to provide a pointing or other nonverbal response to demonstrate his comprehension of language.

Input

In considering teaching tasks presented to a child, it is necessary to know the specific input of the task. One might consider the sensory modality, whether the task is auditory or visual, or simultaneously auditory and visual. If one is working on *auditory* discrimination or *auditory* blending one must be certain that the task involves *auditory* input alone without

pictures or printed words being present. To gain specific kinds of information we would want to provide tasks that are auditory, others that are visual, and others that are simultaneously auditory and visual. The more specific we can be in evaluating the nature of the input and the success of the child's responses, the more effective we can be in recommending a teaching program.

In the area of input it is also necessary to consider the length of the input and its syntactic complexity. We may need to adjust the length of the input so that the child can handle the memory load. It has also been suggested that one understands and remembers better if the syntactic structure that he hears is one he uses in his own expressive language (Slobin 1971). Johnson (1967) discussed a system for analyzing tasks for assessment and teaching the learning-disabled child. Specific suggestions for remediation for oral language disorders can be found in Johnson and Myklebust (1967) and in Wiig and Semel (1976).

Receptive Language Disorders

There are a number of systems one might use to study language disorders. One system involves evaluation of the child's receptive and expressive language functioning. Here we ask what does the child understand about the language that he hears and how well is he able to express himself in his native tongue.

In the area of receptive language some of the questions we may ask include:

> Does he understand vocabulary?
> Does he understand connected speech or the varied morpho-syntactic structures used?
> Is he able to remember what he hears and apply it for use?

When assessing receptive language skills it is important to note whether or not there are differences between the child's ability to recognize a word and its meaning and to use the word in his speech. For this reason, we provide tests or tasks that allow the child to point to indicate his comprehension of the word. One such standardized test is the Peabody Picture Vocabulary Test (Dunn 1959). This test is appropriate for children of young preschool age through age 18. The teacher or clinician may devise tasks to provide information more directly related to the child's daily experiences.

Remember that instructions the teacher uses daily may contain words that the child does not comprehend. For instance, he may know how to *draw a circle* but may not know the meaning of *circle* when it is used as a verb. He may have difficulty with the meaning of words such as *mark* or make a *cross* on_____. Being certain that the child understands the language of instruction is important. The Boehm Test of Basic Concepts (Boehm 1969) provides information regarding vocabulary and concepts expected to be mastered by kindergarten and early school-age children; but similar tools are necessary for older children as well. Until standardized tests are available it is the responsibility of the teacher or clinician to devise tasks that measure school related vocabulary. Recently, I observed a fifth-grade girl doing her spelling homework. Not only was she unable to read some of the words that she was studying for spelling but was required to list three of the words in the spelling list that were antonyms for given words. She had no idea of the meaning of the word *antonym*. When questioned she also did not know the meaning of the word *opposite*. Such a problem with vocabulary involved in the lesson ensured her failure in the homework assignment.

Some examples of clinical tasks to evaluate language comprehension follow. The child might be shown an array of pictures or toy objects of a car, apple, chair, cat, house, coat, and dime. You might assess comprehension of concrete nouns, parts of objects, and more abstract nouns. The child could first be asked to point to the object as it is named. For parts of objects he could be asked to point to *leg*, *collar*, *sleeve*, *stem*, *handle*, *wheel*, *chimney*, *roof*, *door*, *tail*, or *ears*. With these same pictures he could be required to point to the superordinate or category word such as *fruit*, *furniture*, *clothing*, *animal* or more abstract or unfamiliar nouns such as *dwelling* or *vehicle*. The child could be asked to point to the one that is shaped *like a circle* or *like a square*; the one made of *wood*, *metal*, *glass*, *cloth*; the one that is *covered with fur* or with a *coat of paint*.

If the desired response were *cat*, the input could vary from simple to complex. He might hear: *Point to the cat. A kitten will grow up to be a* _____. *A kitten is a baby*_____. *Find an animal. Which is an animal that says meow? What animal eats mice? Show me an animal that is covered with fur. Which animal can be a pet? Find a picture that rhymes with bat. Show me a domestic animal. Find a picture of a domestic animal that is a member of the feline family.* The response of pointing to, or naming, the object can be simple, but the language can be manipulated so that increasingly difficult vocabulary is being tested.

Verbs can be assessed by having the child carry out an action, manipulate objects, or find an object to tell about the actions. For example, he could be asked to *run*, *jump*, *sneeze*, *cough*, or *walk*. He could make doll figures *run*, *jump*, or *walk*. He could find objects that might *break*, *tear*, *move*, *grow*, or *cry*. Verbs can most effectively be taught as part of an activity rather than through the use of pictures. In all cases, before pictures are used to assess verb comprehension, it is necessary to determine that the child has internalized the notion of the action being represented by the picture.

To assess understanding of pronouns, the child might be required to point to other children in the class. He might be shown a picture of a boy, a girl, a boy and a girl and be required to point to *him*, to *her*, to *them*, to *his* pocket, to *her* pocket, to *their* shoes, to show where *he* is or where *she* is. Some adjectives related to sensory and perceptual experiences may be assessed in isolation as, for example, words related to size, color, shape, temperature, and texture.

Clark and Clark (1977) and others divide words into content and function words. The content words are nouns, verbs, adjectives, and adverbs; the function words include pronouns, determiners, prepositions, conjunctions, etc. Many of the content words are simple to assess and teach in isolation but function words generally must be embedded in context. For example, prepositions have little meaning as isolated words. In evaluating and teaching prepositions, the spatial and cognitive properties of the experiences associated with the words must be considered. The preposition related to the child's body in space is a different experience than the same word used in a two-dimensional plane as a picture. For instance, the word *under* is different if the child is to crawl under a table, put a penny under a box, walk under a pole, or draw a line under a picture or word on a test or in a workbook. Before asking the child to draw a line under a pictured object, we may have him select a picture to demonstrate his understanding by pointing to a drawing of a line under a tree, above a tree, on a tree, or around a tree, for instance. In order to say that a child knows the meaning of the preposition it must be evaluated in various contexts.

Comprehension of syntax and morphology as well as vocabulary can be assessed in preschool children and children to the age of seven by the Test for Auditory Comprehension of Language (Carrow 1973). A useful set of tasks that can be used to assess syntactic structure in school-age children has been devised by Bellugi-Klima (1972). The children are required to

manipulate toy objects to demonstrate understanding of various morpho-syntactic units. If a child does not understand the meanings of the word endings *-ing* and *-ed*, for verb tense, or *-s* for plurals and possessives in his oral language, he may not attend to such features when he sees them in print for reading.

Another area to be evaluated is auditory memory. In addition to tests, such as repeating digits on intelligence tests or repeating unrelated words and sentences as on the Detroit Test of Learning Aptitude (Baker and Leland 1959), teacher-devised tasks can be important. Reduced auditory memory can affect the child's performance in school. Some children cannot hold in mind two items long enough to make a decision about them. For instance, a child may not be able to remember the two words *pin* and *pen* long enough to tell if they are the same. He may be unable to remember the words *apple* and *carrot* in order to say what is alike and different about them. These children may not remember assignments presented orally and may have difficulty remembering in-class instructions. When providing remediation for auditory memory, it has been useful to present meaningful materials, such as oral directions, in short units or to give practice in remembering words to make comparisons and contrasts rather than to provide drill in repeating digits or sentences. As material and information become more meaningful and useful to the child, his performance on specific tasks of immediate auditory memory seems to improve.

In evaluating the child's receptive language we need to ask ourselves if he understands the vocabulary used, if he comprehends the morpho-syntactic structure of the language, and if he can remember the input units presented.

Expressive Language Disorders

In the area of expressive language some of the questions we may ask include:

Does he use appropriate articulation for his age?
Does he use age appropriate vocabulary?
Is he able to retrieve words that he wants to use?
Can he formulate sentences with varying syntax?
Can he formulate paragraph speech?
Can he express abstract concepts through the use of language?

In normal language acquisition, children by about eight years of age can articulate the sounds of the language. If the child continues to show defective articulation of specific sounds, he should be referred to a speech pathologist. At a younger age, if his speech shows delayed onset or if he is unintelligible, he should be referred to a speech/language pathologist for evaluation and management. Such services are available in most schools or communities.

Many children with language disorders have problems with retrieval of words. The word may be present in the comprehension vocabulary but the child cannot call it up voluntarily for use. This is the same sensation as when the adult is trying to think of a person's name, or of a specific word he wants to use, and thinks or says, "Oh! it's just on the tip of my tongue." Children with such problems may use associated words, circumlocutions or a roundabout way of describing the word, or may show delayed responses. As one child said, "I know it in my mind, I just can't say it." Other examples include a six-year-old child referring to a safety pin as "a thing for a baby" and an eight-year-old girl calling a gate a "fence door." Such children can generally indicate that they do know the word if the question is worded in multiple choice form. Children with retrieval, or word finding, problems may demonstrate characteristic errors in reading, such as *cat* for *kitten* or *party* for *birthday*. The child with retrieval problems may have difficulty with a reading task where he is required to supply a word for a blank space, as on the passage comprehension subtest of the Woodcock Reading Mastery Tests (Woodcock 1973). He may perform better on a comprehension test where he is provided with a choice of words to fill in a blank, as on the Gates-MacGinitie Reading Tests (Gates and MacGinitie 1964).

For evaluating syntactic structure, the Developmental Sentence Analysis (Lee 1974) is available for children through the age of six years. Although sentence repetition tasks to assess syntax usage are controversial, the Carrow Elicited Language Inventory (Carrow 1974) is a standardized instrument through the age of seven years. This test requires children to repeat sentences of various syntactic structures.

A clinician or teacher interacting with a child in a play situation using toys or picture books can usually elicit a spontaneous language sample from preschool children. For older children, you can select action pictures to elicit specific structures, such as subject-verb, plural subject-verb, subject-verb-object, etc. Information about the child's oral expressive language can also be gained from having him define words. For instance, the child who defines a clock as "time," a fork as "eat," and a taxi as "ride" requires further evaluation of his expressive language skills.

Clinical measures that have been useful in evaluating children's facility with oral language formulation include sentence-completion tasks involving knowledge of conjunctions or requiring the use of clauses. For example, the child is asked to complete sentences such as the following:

Mother bought meat and_____.
I saw you but_____.
Do you want to paint or_____.
The boy who_____.
The house which_____.

It has also been helpful to present children with tasks of sentence building using various types of words. Words with varying tense markers as *jump, jumps, jumping, jumped* might be presented. Words of different parts of speech can be used. With older children, it has been useful to ask them to formulate sentences with such words as *obey, obeyed, obedient, obedience.* It seems that children without language problems have internalized the rules of the language, even though they may not be able to verbalize the rule, and can in an automatic way complete sentences or show facility in building sentences with given words. In contrast, children with language disorders have difficulty with such tasks.

It is also important to provide opportunities for children to give oral responses in paragraph form rather than with single words or phrases. Asking them to tell about a movie or a television program, to tell how to make or do something such as placing a phone call, making a sandwich, or building a kite have been useful in eliciting paragraph speech. Utilizing the same stimulus material or questions over time can allow clinicians or teachers to develop notions of what can be expected from children at various ages.

With older children it becomes important to determine if they can listen to a paragraph or longer unit, take notes on it, organize the notes, and then verbalize specific content about the unit that they have heard. It is helpful to provide cues for the youngsters before they listen to the paragraph. They could be told to listen for specific details, for the main idea, to think of a good title, to guess what might happen next, or what might have happened before the selection is read to them. Later, they could be required to listen to the passage without specific cues being provided before the selection is read. If youngsters have difficulty with such a task, they are likely to have problems taking class notes, organizing material for study, taking tests, and writing compositions or book reports.

Frequently reports state that a child has difficulty with abstract thinking. Such a statement is often made because of the child's responses

on intelligence tests. Since the child must demonstrate his abstract knowledge by a language response, the only fair judgement we can make is that he has difficulty expressing abstract ideas through the use of language. When language is the response mode, it is necessary to evaluate nonverbal cognitive skills without requiring a language response. Various activities can be tried: associating objects such as a sock and shoe, a knife and fork, or a coin purse and money; sorting objects in groups or categories; and hearing a category name and sorting objects appropriate to that group. In this way, the child can demonstrate some conceptual skills at a nonverbal level. He can then be encouraged to verbalize the reasons for his associations or category choices. Exercises where he can compare real objects, pictures, and named objects on the basis of perceptual attributes such as color, size, and shape and on conceptual attributes such as function or category may be encouraged.

Piaget and others write that children's language reflects their cognitive skills. Children's concepts and word meanings continue to expand and become enriched with increasing life experiences. Using children's answers to questions about life (Piaget 1969), we can see how the concept of *alive* develops. At first the child thinks that anything that *does something* is alive. The sun is alive because it gives light; an oven is alive because it cooks dinner; poison is alive because it can kill us; fire is alive because it's used for lots of things. A mountain is not alive because it is not for use. At a later stage there is *movement* involved in the children's notion of alive. A bicycle is alive because it can go, the sun because it moves, a fish because it swims. A table is not alive because it can't move. A lake is not always alive; sometimes it moves and sometimes it doesn't. At the next stage the child introduces the idea of *spontaneous movement*. A fire is alive because it moves on its own; a stream because it flows alone; the wind because it moves by itself. Finally the children develop the concept of alive as adults know it. (However, we can speculate on how well we ever know the meaning of *alive* when there are medical and social questions regarding when a human being ceases to be alive.)

In evaluating a child's expressive language we want to assess his articulation, his use of vocabulary, his sentence formulation, his facility to retrieve known information, his ability to formulate a paragraph, and his manner of expressing abstract ideas through the use of language.

Deficits in Auditory Analysis and Synthesis Skills

When evaluating oral language it is useful to include as part of a test battery, tasks requiring auditory analysis and synthesis. Deficits in these

skills can affect oral language as well as relating to problems with reading and written language.

Children may confuse words that sound similar. For instance, a child said that *rust* means "to sleep for a little while." Another child stated that an *alibi* was "when you sing the baby to sleep." Useful tasks can be devised for the child to tell whether the words are the same or not. The contrasts could be short vowels (*cough-cuff*), voiced-voiceless contrasts (*rode-wrote*), or initial or final sounds varying on other dimensions.

Some children with language disorders have difficulty with sequencing sounds within words saying "cufiss" for *cursive*, "tackeens" for *antiques*, or "extra neighbor" for *next-door neighbor*. Such errors can be observed in spontaneous speech as well as with tasks of word repetition.

Auditory synthesis skills can be observed by having the child listen to word parts and blend them together to form a whole word. Clinical experience has suggested that it is easiest for children to blend compound words, then two-syllable words, and then CVC (consonant-vowel-consonant) words (Zigmond and Cicci 1968). If the child cannot listen to the parts and blend the word together orally, we might present the word parts with a pictured selection of objects for him to choose. The same process could be used for teaching. The child could hear the word parts, point to the picture, say the whole word, have the picture removed, hear the word parts, and then say the whole word.

A skill in auditory analysis that seems to relate in a direct way to spelling is listening to polysyllabic words and dividing them into parts. This is a skill that appears to be present at an automatic level in good spellers and absent in poor spellers. At times the youngster can perform the auditory task but needs help to apply this skill as an aid to spelling words with a close phoneme-grapheme correspondence. Other children are unable to manage the task although they are successful with blending. Such words as *today*, *yesterday*, *accomplishment*, and *multiplication* seem useful to elicit deficits in this area.

Many beginning reading workbooks have exercises requiring children to look at a picture and to write the initial and final consonants. The child must look at a picture, such as the *sun*, recognize what that picture represents, retrieve the word saying it to himself, retain the auditory sequence, remember the first and last sounds of that sequence, recall how to form the letter that makes the sound, and then execute the motor pattern for writing the letters. A series of complex skills is required. While most six-year-old children manage such tasks easily, those with language disorders fail

because they may not have the skills of auditory analysis and synthesis, or they may have memory problems, or deficits in the motor act of writing.

Summary

This paper has reviewed some approaches to the evaulation of oral language and indicated how different views influence our assessment and management of oral language problems. Some systems for classifying responses and input modalities have been discussed. Suggestions for evaluating receptive and expressive language and some skills of auditory analysis and synthesis have been presented.

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Language Competency, Dyslexia, and Learning Disability

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Introduction

Theories of dyslexia are characterized by the special emphasis they place on either linguistic or nonlinguistic factors as causes of reading disability.[1] This paper will discuss emerging evidence in favor of the linguistic interpretation of dyslexia.

The works of linguistic philosophers, such as Ludwig Wittgenstein, who argue that our personal language reflects our experiences and perceptions of reality, lend support to a linguistic theory of dyslexia. Linguistic philosophers view language as the window through which we perceive meaning in our world (Engle 1970; Wittgenstein 1953, 1958, 1961a, 1961b). When symbols represent real events or thought, language is critical for interpretation.

The underlying hypothesis for a linguistic theory of dyslexia is that, regardless of the nature of a child's learning handicap (e.g., perceptual, motor, or memory deficits), the specific problem will eventually manifest itself in language functioning and, as such a child approaches the task of reading, these cumulative verbal deficits will hamper his success in decoding and comprehension (Clinkert 1977).

To understand the verbal deficit hypothesis, one must allow an extension of the ordinary definition of language to include the concept of semiotics. Semiotics expands the notion of conventional language to include signs and symbols,[2] so that mathematics, for example, is a language with a specialized syntax and vocabulary.

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[1]The term *dyslexia* will be used to refer to children with severe decoding or comprehension problems which appear not to be attributable to low intelligence, poor sensory acuity, neurological dysfunction, emotional disorder, or environmental deprivation.

[2]Semeiology, from the Greek *sēmeiōtikos*, *sēmeion* (a marker sign) is the art of using signs in signaling or in expressing thought.

From the perspective of semiotics, a dyslexic child who has difficulty producing the sound associated with a grapheme has a naming disorder (phonological encoding disorder) of the same type as exhibited by a child who has difficulty calling up the name of a cat upon seeing a picture of the cat (Marin and Saffran 1975).

According to the linguistic theory of dyslexia, given any symptom of dyslexia, that symptom can be assigned a linguistic deficit interpretation. For example, the classic *b d* and *was saw* reversals need not be regarded only as a disorder in visual-spatial processing. Instead, this phenomenon might be explained as a verbal encoding problem; i.e., the subject says "saw" when "was" is presented because the names of the letters (graphemes) are look-alikes. This error is not different in kind from a child calling Aunt Alice "Aunt Mary" because Alice and Mary look alike to the child. Here the child does not literally see Aunt Mary when Aunt Alice appears, and the child does not literally see "saw" when "was" is presented. If the child literally reversed such verbal symbols visually, the same anomaly would occur with respect to nonlinguistic visual stimuli. Recent research (Benton 1975, Vellutino 1975) demonstrates that in dyslexics this anomaly does not persist in the perception of nonsemiotical stimuli. Similarly, other classic examples of perceptual, motor, or memory deficits can be reinterpreted to be symptomatic of linguistic processing disorders.[3]

What practical difference does it make whether the linguistic or nonlinguistic explanation is accepted? The answer which suggests itself is that whichever theory the practitioner adopts will determine the identification, diagnosis, and treatment procedures that will be used in the clinical or educational setting.

The debate between adherents of the linguistic explanation and nonlinguistic explanation is naturally carried into the wider context of learning disability. Since dyslexia is reputedly a species of (or a consequence of) learning disability, theories of dyslexia are unavoidably entangled with theories of learning disability.[4] The issue is particularly embedded in a current controversy in the field of learning disability which involves the efficacy of the identification and remediation procedures now in wide use in special education. For example, there is evidence that perceptual-motor-

[3]See especially Frank R. Vellutino, "Alternative Conceptualizations of Dyslexia: Evidence in Support of a Verbal-Deficit Hypothesis," *Harvard Educational Review* 47: 334 (August 1977). Vellutino systematically revises the diagnosis of auditory discrimination problems, visual memory problems, and the like as manifestations of verbal deficits. (See also M. Rawson's review of this issue of the *Harvard Education Review*, p. 251.

[4]See M. Rawson's "Dyslexia and Learning Disabilities," p. 43. Editor.

memory tests are not reliable differentiators between "normal" and "learning-disabled" children (Colarusso et al. 1975, Larsen et al. 1976).

It is now believed by many (Gomez 1970, Marin et al. 1975, Wiig and Semel 1975, Scholl 1976) that regardless of the nature of the specific learning disability exhibited by a child, its academic manifestation will be in language disorders. This belief implies that a universal symptom of learning disability is language disability. For example, Wiig and Semel (1975) found that when learning-disabled students are compared with their "normal" peers, the learning-disabled students exhibit more oral language problems such as deficits in oral syntax, slow word retrieval, and other verbal problems. If this hypothesis is correct, language assessments may be more reliable identifiers of learning disability than perceptual-motor-memory tests.[5]

It is also believed by many (e.g., Dunn 1971, Scholl 1976) that remediation of learning disability should begin at the level closest to its academic manifestation, that is, at the linguistic level and not the perceptual-motor-memory level.

Confirming the hypothesis that language competence is a better differentiator between "normal" and "learning-disabled" children than perceptual-motor-memory competence will have important consequences for special education. First, identification procedures could rely upon language assessments. Second, remediation would strongly focus on the development of expressive and receptive language competency.

The pilot study described below was undertaken as a tentative test of the hypothesis that language competence is a better differentiator between "normal" and "learning-disabled" children than perceptual-motor-memory competence.

The Study

Subjects

Three hundred and ninety-seven children were selected from 14 first-grade classrooms in an upper middle-class suburban school district. Excluded from the sample were all mentally handicapped, physically

[5]See also "Metalinguistic Awareness and Reading Strategies" by P. E. Hook and D. Johnson, p. 62. Editor.

impaired, emotionally disturbed, behaviorally disordered, bilingual, non-English speaking, hearing-impaired, and visually-handicapped children. Less than five percent of the subjects were from minority groups. The mean I.Q. score of the subjects was 115 (ranging from 84 to 150+) as measured by the *Otis Lennon Mental Ability Test*.

Procedure

In October 1976, the group of 397 first-grade students was given a language assessment and a perceptual-motor-memory assessment. Within the group, 25 had been previously identified (in preschool, kindergarten, or September of first grade) through screening as being learning-disabled (LD) on the basis of typical identification criteria: i.e., IQ-achievement discrepancy, professional consensus, and performance on the Wechsler Intelligence Scale for Children (WISC) and the Illinois Test of Psycholinguistic Abilities (ITPA). Each item of evidence was given the same weight in the decision process.

It is difficult to characterize any of the tests used in the LD screening as either linguistic or nonlinguistic. The so-called perceptual-motor-memory tests depend on language, if only in the establishment of directions. Also, tests thought to measure language ability, such as the ITPA, clearly depend on memory, visual processing, intersensory integration, and temporal order perception.

All of the 397 subjects were individually given three tests: The *Peabody Picture Vocabulary Test* (PPVT), a modification of the *Purdue Perceptual-Motor Survey* (PPMS), and the *Preschool Language Scale* (PLS). The PPVT and PPMS are rather well known and widely used tests. The PLS was produced in 1973 in connection with a nationally validated, Title III ESEA project entitled "Early Prevention of School Failure." The PLS was thoroughly validated: the Pearson correlation coefficient comparing pre- and post-test scores was .773 at the .001 level of significance. Also, a concurrent validity study comparing the PLS with the Stanford-Binet resulted in a Pearson correlation coefficient of .776 at the .001 level of significance.

Unfortunately, no comprehensive system exists for assessing every aspect of language functioning (including semantic, syntactic, pragmatic, prosodic, and nonverbal factors). The language assessment given each of the 397 subjects consisted of the PPVT (measuring receptive language, *inter alia*) and the first four subtests of the PLS (measuring syntax, following directions, vocabulary, and vocal integration).

The perceptual-motor-memory assessment consisted of the last subtest of the PLS (auditory-visual-sequential memory) and the modified Purdue (PPMS) which measures body image, manual dexterity, body movement, and eye-motor coordination.

Results

The results of the study are presented in Tables I, II and III. In Table I we see that the mean language score of the "normal" group (34.79) was significantly greater than the mean score of the LD group (27.68). This difference is significant at the .05 level. A special t-test was used because the variances were unequal and the LD group was small (less than 30).

Table I
Results of Language Test

Group	*N*	*Language Inventory Mean Score*	*Standard Deviation*	*Variance*
LD	25	27.68	7.04	49.56
Normal	372	34.79	5.32	28.30

Table II presents the average result of computing the discrepancy in months between the chronological age and the "vocabulary age" (*Peabody Picture Vocabulary Test* mental age) for each subject. For example, if a subject has a chronological age of 71 months and the subject has a raw score on the *Peabody Test* which corresponds to a mental age equivalent of 87 months, his chronological-mental age discrepancy would be +16 months. The +16 indicates that his vocabulary age is 16 months greater than his chronological age. We see that the normal group exhibited a greater vocabulary competence (+15.02 months above their chronological age). The significance of this finding lies in the magnitude of the difference between the learning-disabled group's performance and the normal group's performance. This difference was found to be significant at the .05 level using the t-test described earlier. The fact that the learning-disabled group scored above their chronological age (+3.76) would not be surprising to those who

work with learning-disabled children. One of the characteristics of such children is that, while they often score above the fiftieth percentile (because of high I.Q. or socio-economic status), they often perform significantly lower than their normal peer group on the same test.

Table II
Mean Discrepancy Between Chronological Age and Vocabulary Age

Group	*N*	*Mean Discrepancy in Months Between CA and MA*	*Standard Deviation*	*Variance*
LD	25	+3.76	15.67	245.55
Normal	372	+15.02	11.93	142.32

Table III presents the results of using a version of the Pearson product-moment correlation (point-biserial) to compare poor performance on the various subtests of the battery with the learning disability attribute.

Table III
Correlations between LD and Low Test Performance

	Low Score on Language Subtests	*Low Score on Memory Subtest*	*Perceptual-Memory Survey*
LD	.35	.19	.16

Table III points out that poor performance on the language subtests is a better identifier of learning disability than poor performance on the perceptual-motor-memory subtests. The language correlation of .35 is considered to be a "moderate" correlation whereas the memory and

perceptual-motor correlation of .19 and .16 respectively, are considered to be "low" correlations.

Summarizing the results, we find that in this study: the learning-disabled children did not achieve as well as the normal students on language tasks; the learning-disabled children generally did not have as good a vocabulary repertory as the normal children; and the performance on language tests yielded a better correlation to learning disability than performance on perceptual-motor-memory tests.

Conclusion

The results of this study offer support for the general hypothesis that language competence is a good identification criterion of learning disability and a better identifier than the traditional criterion of perceptual-motor-memory competence.

It should be noted that this preliminary exploratory study was limited by three restrictions. First, the language assessment tests do not comprehensively measure all aspects of language functioning (including semantic, syntactic, pragmatic, prosodic, and nonverbal factors). Secondly, there is an inherent contamination problem in language and nonlanguage tests. The perceptual-motor-memory tests depend on language, if only in the establishment of the directions. Also, the language tests clearly depend on memory, perception, and motor components. Thirdly, partitioning a group of students into learning-disabled and normal subgroups is an uncertain process at best, often resulting in the identification of false positives and false negatives. Therefore, any attempt to correlate learning disability to test performance accurately is limited by the accuracy of the given partitioning process.

It is recognized that further empirical testing must be conducted before any strong inferences are made about the language disability model of learning disability. Based on the exploratory data reported here, however, it appears that further study is warranted.

The urge to view learning disability as language disability arises not only from mounting empirical data but also from an ontological perspective that posits language as the crucial feature of all of man's experiences. Furthermore, the study reported here, though merely exploratory, nevertheless presents the probability that applying *learning-disabled* as an "umbrella" term to young high-risk children may preclude precise and

appropriate educational intervention. It is important to distinguish dyslexic children from those with a more generalized or other learning disability. This distinction is of particular significance with regard to initial teaching strategies for reading acquisition by the first grade child.

Even while distinguishing between specific language disability and other kinds of learning disabilities, it may be an error to overlook the possibility of underlying language deficits in all young high-risk children. Language assessment—semantic, syntactic, pragmatic and prosodic—might be useful as a predictor of general learning disability in children. Furthermore, language therapy might be appropriate for most children with learning disabilities along with other kinds of therapy directed toward the specific disability.

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Memory and Mental Images in Verbal Deficit Modification

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This paper reviews some of the experience of the memory consultation service at the Neurological Institute of New York and suggests that human memory is a complex process. The use of mnemonic systems can bypass specific functional defects to improve modality-specific memory disorders. The case of Albert Einstein and his use of visual methods of thinking to overcome deficiencies in verbal learning illustrates the process.

Modality Specific Memory Disorders in Man

Modality specific memory disorders have been produced in the octopus by selective oblation experiments (Young 1966). Removal, for instance, of the optic lobe results in marked impairment of visual memory and learning but with preservation of tactile memory. Removal of posterior buccal lobe produces marked impairment of tactile memory whereas visual memory remains intact. The existence of such regional specialization of memory in the brain of this form of life has raised questions about similar specialization of memory function in the brain of man. Remarkable differences do exist in the ability of "Korsakoff" patients to learn motor and kinesthetic tasks while they are unable to remember visual or verbal material. This suggests that a separate center exists for motor or kinesthetic memory (Milner 1970). Milner's work indicates that lesions in the language hemisphere (called "dominant" in this paper), tend to impair verbal memory and learning, whereas lesions in the other hemisphere ("non-dominant"), tend to impair non-verbal learning and memory. Similar results, differing only in details have been reported by others (Barbizet and Cany 1969).

This article is an adaptation of a presentation at the 28th Annual Conference of The Orton Society at Dallas, Texas, November 1977.

My purpose here is to illustrate how the pattern distribution of modality-specific memory defects depends on the location of the site of pathology.

Material and Methods in Modality Study

A special consultation service for patients with memory defects was established at the Neurological Institute of New York in 1970. The patients reported in this paper were referred specifically to that service by their ward or private physicians. At least one resident and an attending neurologist took a detailed history and gave a physical examination to each patient. Each patient had an electroencephalogram, an echoencephalogram, a brain scan, skull films, and a lumbar puncture. Synthesis of all available data determined lesion locus and the diagnosis. To confirm the diagnosis, pneumoencephalograms and arteriograms were used when indicated. Detailed memory evaluations were done on each patient using methods reported elsewhere (Patten 1972) to obtain a profile of memory assets and defects.

Results

Patients with Left Hemisphere Lesions. This section will describe 14 patients with well localized left hemisphere damage. The patients, five women and nine men, ranged in age from 28 to 76 with an average age of 52. Diagnoses varied from stroke to glioma and in each case the localization of the lesion was proven by arteriogram, pneumoencephalogram, or operation, or by correlating the clinical examination with electroencephalographic abnormalities. Degree of memory defect showed no obvious relation to the intrahemispheric position of the lesion, and the severity of the memory defect did not correlate with the severity of the hemiparesis or other neurological signs. All patients, however, had some kind of memory defect. Distant memory was impaired in six out of the 14 cases. In three of the six, the defect involved only distant events of an impersonal nature but with memory of distant events of a personal nature preserved.

All 14 patients had verbal recent memory defects whereas only three had visual memory defects. The three patients with left hemisphere lesions who showed some mild visual memory defect all had possible compromise of right hemisphere function. For example, the large left frontal-temporal arteriovenous malformation of one case could be stealing blood from the right hemisphere. The left temporal glioma of another case could be exerting pressure and causing compromise of right hemisphere function,

and the stroke of the third patient could reflect the predominant and most acute lesion in a brain actually involved diffusely.

The striking finding of a marked dissociation between poor recent memory for verbal material and good recent memory for visual items suggests that the dominant hemisphere is specialized for verbal memory in the same way that it is specialized for other verbally mediated tasks such as speech. Although Milner (1970) used different testing systems, the findings were similar.

Gustatory memory was impaired in 4 of the 13 patients (one could not be tested) and was stable compared to verbal recall. Olfactory memory was impaired in only one of the 14 cases.

The findings indicate that there are modality-specific memory regions in the human brain, and that a lesion in one part may influence one kind of memory more than another.

Patient with a Right Hemisphere Lesion. A 48-year-old man with a stroke involving the non-dominant hemisphere had marked defects in recall or recognition of impersonal memories, and in recognition of visual or olfactory test items after distraction. No firm conclusions can be drawn from this one case alone, but the findings of marked impairment of visual memory with preserved verbal memory is the opposite of the findings in dominant hemisphere disease.

Detailed psychological testing of this kind of patient has revealed visual memory defects (Milner 1970) but the practical, clinical importance of this finding has never been demonstrated. The paucity of patients referred to the memory service with only right hemisphere pathology is probably due to the fact that visual memory is relatively non-essential in everyday life; patients with right hemisphere lesions are either satisfied with their preserved verbal memory or they and their physicians are unaware of the visual memory defect.

Patients with Bihemispheric Disease. Thirty-five patients, classified into three groups, are reported. Group I had bilateral cerebral atrophy demonstrated on pneumoencephalogram. Group II had low pressure hydrocephalus, meeting all of the clinical and laboratory criteria for that diagnosis as defined by Adams, Fisher and Hakim (1965). Group III consisted of well defined bilateral cerebral disease in patients with tumors, head trauma, encephalitis, and strokes.

All patients had some kind of memory defect. Memory changes, especially in the atrophy and low pressure hydrocephalus groups, were among the earliest and most common feature in the initial presentation of

the disease. Memory for recent events always was affected first, and no case had distant recall impaired without also having some defect in recent memory. Among the recent memory modalities, the verbal was most frequently defective with impairment in 95 percent of the Group I atrophy cases and in all of the Group II low pressure hydrocephalus cases and Group III miscellaneous cases. Visual recent memory was involved in 80 percent of Group I and 100 percent of Group II and Group III. Gustatory and olfactory modalities were also defective in some. The actual pattern distribution of recent memory modality defects in individual patients was variable and probably reflected the pattern distribution of hemispheric pathology in each case.

Contrary to expectation, distant memory was normal in only 20 percent of the patients; 80 percent had marked impairment of distant memory for impersonal events. Only 34 percent, however, had impaired recall of distant events and memories of a personal nature. No patient had memory of personal events impaired while memory for impersonal distant events was preserved. In other words, impaired distant memory for impersonal events had to occur before impaired distant memory for personal events occurred.

Conclusions based on case studies. Cerebral atrophy and diffuse cerebral dysfunction tend to affect memory in complex but predictable ways. First, recent memory is impaired and then remote memory is affected. When recent memory is impaired, the verbal modality is affected most frequently with visual, gustatory, and olfactory modalities following. Since modality-specific memories are also dependent on the localization of the lesion, a pathological process that affects the non-dominant hemisphere would be expected to affect the modalities, visual and perhaps olfactory, located in the non-dominant hemisphere with relative preservation of the modalities, verbal and perhaps gustatory, localized in the dominant hemisphere. If remote memory is affected, memories for impersonal events (e.g., a world war) are affected before memories for personal events (e.g., the birth of a child). Efficiency of distant recall is clearly dependent on the type of memory and its original emotional significance to the individual subject. Contrary to popular belief, distant memory is often severely affected by brain disease.

The case studies cited confirm the impression that human memory is a complex brain function which is dependent upon modality, duration, and lesion localization. The presence of preserved modalities or relatively preserved modalities in brain damaged people indicates the possibility for bypassing the defective modality by attaching the items to be remembered onto the preserved modality to restore memory function. The repair of

verbal memory and learning in such patients is very important. Because, in most cases, visual memory is preserved, or relatively more preserved, than verbal memory, a visual method of remembering can be utilized to bypass a verbal defect. The ancient art of memory, which used mnemonic systems, seems to be one way of meeting such a need (Yates 1966).

Through the use of mnemonics, I have indeed enabled patients to bypass their aphasic verbal memory loss consequent to their dominant (left) hemisphere lesions. By substituting a visually mediated mnemonic system, they are able to rely upon their retained capabilities of the nondominant (right) hemisphere. I have described the system and given examples of its use in an earlier paper (1972). The observations about Albert Einstein, given below, illustrate visual thinking as an alternative to verbal processing.

Some Observations on Albert Einstein and Visual Thinking

Some of the known facts of the life of Albert Einstein and his recorded statements appear to illustrate how someone with a probable defect in the verbal modality can use visual methods of thinking.

Details of Einstein's earliest years are not available. As far as is known, his birth was unremarkable, although his mother thought his head was too large and angular. Despite the "deformity," her doctor predicted that the child would grow well (Sullivan 1972). Although early motor development was normal, verbal development was delayed and Einstein did not speak until the age of three (Holton 1971–1972). His early speech is described as a laborious searching. Each spoken sentence, no matter how commonplace, was repeated silently with his lips, a practice he was finally able to abandon at age seven (Winteler-Einstein 1924). There is no evidence, however, that as a child Einstein had any trouble with eating, chewing, swallowing, or phonating. It seems reasonable therefore, to assume that his delayed verbal development may have been due to some sort of aphasia rather than to aphonia or childhood autism.

School work did not go well for young Einstein. His poor facility with arithmetic, his lack of special ability in any other academic subject, and his great difficulty with foreign language led his teacher to predict that "nothing good" would come of the boy (Sullivan 1972). Nevertheless, Einstein worked carefully and diligently and persevered in doing his arithmetic homework, even though he often came up with the wrong answers.

As a child, Einstein was quick to anger and often violent (Winteler-Einstein 1924). One can speculate that this behavior may have been due to his frustrations. While some of Einstein's behavior may not have exceeded the normal aggressiveness of young boys, it should be noted that behavioral problems are a common cause for referral of children who are having difficulty with school learning. The striking contrast of Einstein's reportedly poor behavior as a child with his remarkable gentleness and sensitivity as an adult suggests that the behavior was conditioned by his frustrations. As his unique skills were recognized and as he achieved distinction as a scientist, the aggressive behavior seems to have vanished.

Even in adult life, Einstein's verbal disabilities persisted. He once remarked to R. S. Shankland, "When I read I hear the words. Writing is difficult, and I communicate this way very badly" (Einstein 1963). His nonverbal abilities, however, provide a sharp contrast. Even before the age of 10 he engaged in activities that required patience, precision, and thoroughness as well as a feeling for spatial relations, balance, and symmetry.

The extracurricular study of geometry was a special interest and his uncle, Jakob Einstein, a successful engineer, challenged him with geometrical puzzles. When his uncle presented the Pythagorean Theorem to him, Einstein thought the theorem obviously true from mere visual inspection and in no need of proof. He reasoned this from seeing that "the acute angle determines the sides" (Holton 1971-1972). He then went on to prove the theorem by a method of his own based on similarities of triangles. This demonstration was different from the orthodox proof and was an early indication that the boy was a creative thinker.

At the age of 15, Einstein left his school in Munich to attend a Swiss school founded by Pestalozzi, an educational reformer, who published in 1801 his ideas on visual methods of learning and teaching (Clark 1971). Basic to Pestalozzi's approach was the view that "conceptual thinking is built on visual understanding; visual understanding is the basis of all knowledge" (Pestalozzi [1801] in Arnheim 1969).

The school freely used maps, diagrams, and other visual materials for instruction. The atmosphere was relaxed and informal. Memorization was discouraged and individual thinking was developed. Each item of learning was carefully linked to a visual base image in accordance with Pestalozzi's principles.

Einstein appears to have flourished in a situation which allowed the free use of the styles of thinking that were so congenial to him. With the

recent organization and partial publication of the Einstein papers, the evidence that this style of thinking was nonverbal and visually mediated cannot be doubted.

The psychologist, Max Wertheimer, a friend of Einstein, had many opportunities to question the physicist on the concrete events in his thinking process that led to Einstein's theory of relativity. Einstein told him: "Thoughts did not come in any verbal formulation. I very rarely think in words at all. A thought comes, and I may try to express it in words afterwards" (Wertheimer 1945).

Responding to Jacques Hadamard (1945), Einstein provided an insight into his thought process:

> Words or language, as they are written or spoken, do not seem to play any role in my mechanism of thought. The psychical entities which seem to serve as elements in thought are certain signs and more or less clear images which can be voluntarily reproduced and combined . . . This combinatory play seems to be the essential feature in productive thought—before there is any connection with logical construction in words or other kinds of signs which can be communicated to others . . . Conventional words or other signs have to be sought for laboriously only in a second stage, when the mentioned associative play is sufficiently established and can be reproduced at will.

In his autobiographical notes, Einstein (1949), described the nonverbal nature of his thought process:

> What, precisely, is "thinking"? When at the reception of sense-impressions, memory pictures emerge, this is not yet "thinking." And when such pictures form series, each member of which calls forth another, this, too, is not yet "thinking." When, however, a certain picture turns up in many such series then—precisely through such return—it becomes an ordering element for such series, in that it connects series which in themselves are unconnected . . . For me it is not dubious that our thinking goes on for the most part without use of words.

Thus it seems highly probable that at least one scientific genius was able to overcome a handicap by circumventing the verbal modality in which he was deficient, and to achieve greatness with an unusual way of visual thinking.

Conclusion

Available evidence suggests that human memory and thought are extremely complex and dependent on duration, modality, and brain function. By using unusual modalities and specific visual strategies for remembering and for problem solving it is possible to achieve great success. We should keep this in mind for our educational systems so that students' non-verbal and other unusual thought processes can be used to increase the potential of human thought. Our present verbally oriented schools should not prevent geniuses with visual or other forms of thinking from achieving their full potential. Indeed, the total thinking power of even an average person can also be expanded.

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Orientational Dyslexia: Notes From the Field

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In this article we discuss symptoms that occur together in many children whose main difficulty is with the written forms of language. We suggest that these symptoms are combined so often and are so specific they can be considered a syndrome. The pattern these children exhibit suggests that there is some inefficiency in the way their brains interpret the orientational aspect of language. By orientational we mean, in its broadest sense, the ability to understand the syntactical aspect of language expressed by the order and relationship of words and ideas. Because it is specific enough to be isolated from other causes of reading difficulties and is frequently seen in several generations of a family, this syndrome can be identified and named. Many of its effects can best be treated once it is clearly defined. We have called it *orientational dyslexia*, because the terms *dyslexia* alone or *developmental dyslexia* have been used differently by many investigators to encompass a wide spectrum of disabilities. There are, of course, many kinds of reading disabilities of which this is only one small, but distinct group.

Rather than laboratory research, this essay offers empirical evidence drawn from our 22 years of teaching children with reading problems. We see our role as teachers paralleling the ethologists who go out into the field to gather behavioral data. Teachers are constantly watching how humans learn, how minds group concepts, how thinking develops. By watching children and recording what we see, we move closer to an understanding of the nature of learning to talk and read. We hope that ideas presented in this essay will inspire research to support or disprove them.

One way to distinguish orientational dyslexia from other reading problems is to say what it is not. First, its primary causes are not external

ones, such as ineffective teaching, missed instruction, poverty, or environmental deprivation. Its cause is not a serious deficiency, such as impaired vision or hearing or gross injury to the neurological system. The children who have the syndrome are seemingly intact. It does not have a primary emotional basis, although clearly it may have psychological consequences. These are not children who are fundamentally moody or anxious, dependent or depressed. On the contrary, outside of the academic arena they are lively and curious and involved. (It is true, that after experiencing school failure they sometimes exhibit severe damage to their sense of themselves.) Although these children can be fidgety and resistant, they exhibit no genuine hyperactivity. Their restlessness appears to be a result of anxiety, rather than the driven impulsivity seen in the very different syndrome of the hyperactive child (Douglas 1972). These are not children with short attention spans. One can see them involved for hours working on models or playing backgammon. Sometimes these children can apply enormous effort to learning to read, but for some the energy cost of attention to reading tasks is overwhelming. Also, these are not children with deficits in motor development; large motor development is often outstanding, and some are excellent athletes. Some dyslexics draw beautifully; visual-perceptual deficits are not part of the syndrome (Denckla 1977). Orientational dyslexics do not necessarily have social problems; they are often well-liked by their peers and may even be leaders in their group. On the surface, their speaking vocabulary appears adequate and they may express themselves fluently; a closer look, however, may reveal a weakness in vocabulary, and dysnomia in some may be observed by the careful clinician. Most important, they are not dull children and they are successful in many school subjects. If math is taught concretely, they may be proficient. (Memorizing multiplication tables may present some problems, however, because it relies on verbal recall.) Their nursery school teachers may have reported that they were intelligent, alert and enchanting (Critchley 1970; Bannatyne 1971; Symmes and Rappaport 1972).

Because so many of their higher functions are intact, these bright children seem to be "right on the road to Harvard" until that bleak day when they hit reading instruction. For it is only then that the specific symptoms of this syndrome come to the fore, and though subtle, the dysfunctions are sufficient to cause major difficulties. Reading is perhaps the most complicated mental performance man has achieved, for reading a phonetic code requires the ability to integrate information and involves at least four major functions of the brain in the visual, auditory, motor and language centers.

The Behavioral Manifestations

Let us look at the visible symptoms through what we teachers and therapists actually see: the child's behavior. Most obvious, and most often commented upon, are directional errors. The dyslexic child continues to write letters backward long after other children of the same age have sorted them out. Even in second and third grade, the child may confuse *b* and *d*, *g* and *p*, *t* and *f* (according to the typography in use). Often such a child will start to draw a horizontal line from right to left and a vertical line from bottom to top. These children have trouble learning which is their right or left side and need to rely on some external clue. We see a kindergartener putting a left shoe on the right foot and the fifth-grader checking her ring to determine which is her right hand. Handwriting may also reflect underlying organizational and directional confusion. Memory deficiencies are also apparent. If the dyslexic has been taught to read by sight he cannot remember the sight vocabulary. If he has been taught phonetically he may have difficulty in remembering the sounds associated with the letters or in blending them into words. The dyslexic, however, does not have difficulty with the *concept* that letters represent sounds but with the actual memory task of putting the sounds into proper sequence. Malapropisms may occur in speech. de Hirsch (1974) reports her student, Martin, as saying, "I was a rusher and passed out telegrams" when he meant, "I was an usher and passed out programs." Reversals of the sequence of sounds in words occur (*pesgetti* or *hipioptimus* or *alunimum*). Other frequent sequential difficulties are with the order of the days in the week or the months in the year. There is sometimes an aphasic quality to his speech (*please pass the . . . the . . . um . . . sweet, white stuff*). In some dyslexic children there are difficulties with such tasks as naming colors (Denckla 1972). As the child grows older other symptoms may manifest themselves. His vocabulary is not as rich as that of his intellectual peers and it remains more concrete. Written expression reflects each language problem and spelling is bizarre. If the child has been taught phonics, his spelling will be phonetic—and incorrect. Syntax and agreement of subject and verb may be faulty, words may be left out or oddly sequenced, and pronouns confused. Each new step in the language continuum presents new problems.

The Reading Task

To understand why these bright children can't learn to read with the same ease as their intellectual peers we will begin by examining what is

involved in processing a single spoken word. A spoken word is composed of phonemes (individual language sounds) and the listener must be able to discriminate among similar acoustic clues, remember the sequence of the auditory input, blend the phonemes into morphemes (auditory units of meaning) and, finally, associate a conceptual meaning with the blended sound. This involves the coordinated function of many areas of the brain, especially with the sequential-spatial auditory functioning in the usually language-dominant left hemisphere (Rudel and Denckla 1976). The left-brain auditory functions are particularly involved in reading our written code based on phonemes. Idiographic written systems do not require as complex an auditory input (Liberman 1973). This fact has been overlooked in our methods for teaching reading.

In reading a written word we have an even more involved neurological process. The written word contains a visual symbol (a letter, digraph or diphthong) for each phoneme. To decode a word, that is, to move it from its visual to its auditory form, a beginning reader must discriminate between similar symbols (*h* and *n*) including those that are mirror images of each other (*b* and *d*), sequence the visual images, and relate them to a sequence of auditory units, either aloud or internally. (For highly proficient readers decoding is less often necessary. Words or phrases are absorbed as units from the total visual gestalt.) This calls into play many parts of the brain's cortex, involving visual and spatial functions—all this merely to decode even a single word. Reading meaningful sentences is still more complex because it requires an understanding of grammar and logic. According to linguists, most good readers use their sense of grammatical construction to help them anticipate the written form (Goodman, Smith and Meredith 1970). It is with this understanding of the complexities of grammar—an understanding that depends upon the ability to grasp abstract relationships and spatial relationships—that the dyslexic child has trouble.

Possible Causes of Orientational Dyslexia

From our description of dyslexic children and our analysis of the reading process, we can hypothesize that, at least in part, the problem of dyslexic learners involves (1) the processing of language-sounds in sequence; (2) spatial orientation; and (3) the integration of visual and auditory language information. Dyslexics tend to have difficulty with all three.

Researchers are investigating several possible causes. The tendency to reverse and the difficulty with spatial orientation have been explained in

many ways. Brain researchers have suggested that the separation of the hemispheres in man has created two independent spheres of consciousness with the left hemisphere handling the more analytical and language-related information and the right hemisphere handling the more holistic (Gazziniga 1967). One prominent theory suggests that in dyslexics there is some difficulty with the transfer of information from one hemisphere to the other. A portion of the corpus callosum (the splenium) carries visual information back and forth. Perhaps there is a problem in this mass of nerve fibers that interconnect the two hemispheres. It has also been reported that these connecting areas of the cerebral cortex show the longest period of myelination (myelin being the substance surrounding nerve fibers that effects the speed of transmission). Myelination goes on through life but is mainly completed by around age ten.

Another suggestion is that these children still have bilateral symmetry of the nervous system and have not established a language center exclusively in the left hemisphere of the brain. Perhaps language is developing in both right and left hemispheres and the children switch back and forth, using both sides of the brain. Researchers have investigated the difficulty that animals have in distinguishing right from left and suggest that this trouble might stem from the bilateral symmetry of their nervous systems (Corballis and Beale 1971). Both sides of the brain have the capacity to develop language. Generally, if a child under five suffers severe trauma to the language-dominant left hemisphere and loses his speech, he is often able to regain language by developing that function in the intact right hemisphere.

We have noted that dyslexics often have difficulty with the concept of right and left and other spatial-directional relations. The dyslexic's difficulty with sequencing of sounds and symbols may also have its roots in his confused orientational sense. The same mental inefficiency that seems to make it difficult for the dyslexic to process the difference between *b* and *d* may cause difficulty with complex grammar that has a spatial orientation (i.e., dependency upon word order or on prepositions), such as the difference between "mother's sister" and "sister's mother" or "last week *at* school" and "the last week *of* school" or "Wednesday follows Tuesday" or "Tuesday follows Wednesday." Their difficulty in learning to tell time seems also related to spatial confusion. The difference between "twenty past one" and "twenty to one" eludes them. The direction that the hands of a clock travel is not stable for them. The concept of "clockwise" is consequently, difficult. The fact that "12:40" is the same as "twenty to one" requires a spatial awareness they do not have until they have had

many experiences with clocks and can reliably picture the clock itself. It is not the concept of time that troubles them but rather the spatial manifestations of our timekeeper. Related to this is the dyslexic's difficulty with the concept of north, east, south and west. This is also an extension of right-left confusion, but unlike "left," which is always on the child's same side and relative to his own body, north can be behind or in front of him, to the left or the right. It is not until the dyslexic can stabilize his concept of directions by using references outside his own body (a rather advanced stage of thinking), and relating this to a pictured image of a map that he can grasp this. We do not mean to suggest that all people with spatial problems are dyslexic, but, rather, that dyslexics have difficulty integrating the language and spatial functions of the brain.

The dyslexic's trouble in grasping abstract words may also be related to spatial orientation. Much of our language has spatial references (Clark 1973). We talk about the future as being in front of us. We refer to problems as obstacles to hurdle. We claim we are in between jobs. It is our belief that the weakness in spatial awareness may be an important clue to the nature of dyslexia and should be investigated further (Luria 1970).

Another theory suggests that the dyslexic's right hemisphere, which deals with the gestalt, or the whole image, provides excessive input into mental tasks which require dominance of linear, analytic language processing. Somehow the analytic function of the dyslexic's left brain is not sufficiently involved in the reading process. It has also been suggested that the relay system that incorporates information from the visual, auditory and language centers of the brain is not integrating incoming information properly. Perhaps the problem is in the area of the brain that acts as a "way station" between visual and auditory regions (angular gyrus). No one of the above theories offers a complete explanation. In addition, even within the group we are describing, no two children present precisely the same pattern.

Perhaps the most puzzling aspect of all is the underlying deficit in memory for information tied to language. This weakness can be seen in both short and long term memory for language material, and occurs whether the language input is visual or auditory. Dyslexic children have trouble "catching" the perceptual input (such as hearing the phonemic sequence of a word), consolidating or fixing information in the long term memory (organizing it into categories for storage), and retrieving information from the long term memory (as seen in the aphasic quality of their speech). The puzzling aspect is that this memory deficit is limited to language-related material.

The children can accurately remember the elements of a design (though perhaps not its direction) but cannot recall the spelling of a word. They may remember a melody but have difficulty holding the sequence of sounds in a word. These children often score higher on a visual memory test for objects than on a similar test for letters. They must hear an unfamiliar word many times before they can repeat the sound-sequence correctly. Second languages are extremely difficult for high school dyslexics. They have what for years we have referred to as a "bad ear" for language.

Since the word "memory" encompasses so many mental processes, the question is often asked whether it is the attentional aspects that are inefficient in dyslexics. It is *not* that these children fail to remember because they are not "paying attention" in the everyday sense of the word. When a task does not include recall, dyslexic children demonstrate their ability to focus their attention correctly. They may read a word (recognition) that they cannot write (recall). The failure to remember is an attentional problem only in that the dyslexic child, with his hazy sense of the language structure, does not know how to focus on the salient aspect of what is to be remembered. Fixing material into the long term memory—and perhaps recalling information as well—requires not only alertness to the perceptual input but an *active* processing which fits the new material into one's own personal schemata. It is important to stress that this attention-focusing can be taught and is a major factor in success when working with dyslexic students.

Persistence of Orientational Dyslexia

Is this a true syndrome? Does this problem in learning come from internal causes? Is it a product of the inefficient or faulty working of the brain? There is much evidence that it is. First, it is frequently a familial trait, one that shows itself far more frequently in boys (Orton 1925). Additional evidence to suggest that dyslexia is a true symptom of a dysfunction is that it is not outgrown, that it persists into adulthood. That is not to say that dyslexics cannot succeed in our educational system, even with its heavy stress on language competence. There are dyslexics who are outstanding participants in every field: doctors, architects, physicists, engineers, teachers, writers, lawyers, etc. But their special weakness continues to haunt them.

Dyslexic students can achieve a high level of functioning if their ability to compensate for their deficiency is adequate and if the teacher has sufficient skills to present written material so that it makes sense to them. Many dyslexic students have superior gifts in the non-verbal areas of intelligence. Many are driven to success either by the need to prove themselves or by a genuine and deep interest in a field. As teachers we must recognize these children early, teach them in the way they learn best and create an environment for them where they can develop a sense of themselves as capable, achieving students.

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REVIEWS

Education and the Brain, the 77th Yearbook of the National Society for the Study of Education, edited by Jeanne S. Chall and Allan F. Mirsky. University of Chicago Press, Chicago, 1978.

"Remember the brain" is the theme of this volume, and for those who wish to obtain an overview of current knowledge of the relationship between brain structure and function and learning disabilities, it provides an excellent and authoritative survey. "But don't forget the environment" is a parallel theme which evolves from the numerous examples cited of the impact of environmental stimulation on the development of brain structure and function. "In essence, the neuroscientists writing in this volume are saying to educators that education is central for optimal brain development" (p. 371).

Developed by the Society's Committee on Education and the Brain and edited by the co-chairmen of that committee, *Education and the Brain* comprises 11 chapters prepared by different authors—each dealing with a different aspect of brain function as it relates to education.

The initial chapter, "The Brain Sciences: An Introduction," by T. J. Teyler, presents a lucid review of the basic physiology and anatomy of the nervous system. In simple language, it discusses "(a) What are the components of the brain and how are they connected to one another? (b) What are the functions of these components, and how do they work together? (c) What are the chemical and electrical phenomena underlying the functioning of the components?" (p. 1). This chapter includes references for further reading, but in fact these are the basic questions elaborated upon in the succeeding chapters.

Chapter II, "Attention: A Neurophysiological Perspective" (A. F. Mirsky) and Chapter IV, "The Biology of Motivation" (S. P. Grossman) deal with the substrates for learning. In these poorly defined areas, each author has elected to focus on laboratory investigations which provide reproducible data, but not necessarily of direct relevance to the classroom. It is Mirsky's premise that minor impairments of consciousness may be equated to some extent with disorders of attention, that "defects in attention . . . not severe enough to be called impaired consciousness, may represent minor pathology in the region of the brain necessary for consciousness. Another inference would be that defective attention is due to some temporary functional

disturbance of this area of the brain which is not detectible in any structural way" (p. 37). Having reviewed current knowledge of the anatomical structures essential for preservation of consciousness, and animal experimentation dealing with consciousness, the author concludes that although the same regions may be involved, the regulation of attention is a far more complex process; that cortical as well as subcortical structures are involved; and that attention is more strikingly influenced by past experience, training, motivation, and level of interest. Electroencephalographic and clinical studies seem to have provided "no overriding theory or explanation of all or even a major portion of the human states in which attention impairment is seen" (p. 55). However, the author lists a number of clinical states of altered consciousness and sustained attention defect, and discusses two opposing mechanisms for these impairments—hyperarousal and hypoarousal. Sensory interruption (such as may underlie impairment of consciousness in petit mal epilepsy) is another possible explanation.

Although it is clear that consciousness depends upon the integrity of brainstem and mid-brain structures, attention appears to be focused by manipulation of these structures through descending influences emanating from the higher levels of the cerebral cortex within which present and past events are correlated.

In discussing the biology of motivation, Grossman is also dealing with a poorly defined theoretical construct. Is motivation a complex drive involving directing functions to correct a need or promote survival, or are they simply organized to respond to levels of activation of some part of the brain? Possibly both specific motivational influences (inborn patterns of behavior) and non-specific arousal may be necessary for survival. Using as a model such elementary functions as eating and drinking, Grossman documents that these functions may be strikingly influenced by manipulation (either mechanically or chemically) of specific areas of the brain. However, this type of manipulation has provided only confusing results in efforts to understand more complex motivational phenomena such as avoidance, rage, hyperactivity, and organized aggressive behavior. At present, there appears to be "no viable hypothesis concerning the action and interaction of brain mechanisms that organize adversive motivating states" (p. 140) . . . "this is a particularly difficult time to write about the organization of adversive motivational states in the brain because we have torn apart essentially all of the theoretical models which seemed reasonable only a few short years ago and have not yet gained enough new insights to construct better ones" (p. 141).

This defeated attitude is not reflected in two closely related chapters—that of P. D. MacLean on "A Mind of Three Minds: Educating the Triune Brain," and of H. T. Epstein, "Growth Spurts During Brain Development: Implications for Educational Policy and Practice." Less tied to close anatomical-functional correlations, MacLean describes the genetical evolution of levels of brain structure and function, and describes "primal patterns of behavior"—unborn and inborn and unlearned activities and responses, largely operating at the unconscious level. Such reptilian behavior as territoriality, imitation, perseveration, reenactment, rituality, displacement, and deception are clearly observable in reptiles and other lower animals. They are inhibited by the elaboration of other structures in the brain of higher animals, but continue to influence behavior even in humans, and are observable in the classroom.

Three levels of the brain are described—the "R-complex"—a group of ganglia or clusters of nerve cells, developed in reptiles, and responsible for complex patterns of behavior essential to survival. Superimposed on this, there developed in mammals the "limbic system"—an elaboration of those structures concerned with oral functions and self-preservation—feeding, fighting, and self-preservation. Disorders of this system are associated with alterations in emotionality, memory and personal identity, as well as oral functions such as taste and smell.

At the highest level, the elaboration of the cerebral cortex, especially frontal and temporal lobes, in humans provides for rational control of behavior.

MacLean suggests that the "R-complex represents a neural repository for programming behavior based on ancestral learning and ancestral memory . . . nature economically utilizes the R-complex for the reenactment of currently learned behaviors that have been emotionally conditioned through limbic functions or intellectually executed by the new mammalian brain" (pp. 338–339). In a thoughtful philosophical note, MacLean suggests that survival now depends upon enhancing through training at the appropriate stage of human development the role of the neocortex in such socially essential roles as empathy, compassion, and self-denial.

The appropriate timing of relevant educational intervention is the theme of the chapter on "Growth Spurts During Brain Development: Implications for Educational Policy and Practice" by H. T. Epstein. From studies of brain weight and head circumference this author documents five periods of rapid brain growth which can be correlated with the schema of intellectual development outlined by Piaget, as well as with the growth

curves of IQ. These critical growth spurts are at ages 3 to 10 months, and 2 to 4, 6 to 8, 10 to 12, and 14 to 16 years (the 14–16 stage having no Piagetian counterpart). The author reviews data demonstrating that either physical (nutritional) or intellectual deprivation during these critical periods can eventuate in permanent suboptimal brain growth and intellectual development. "One working hypothesis is that intensive and *novel* intellectual inputs . . . may be most effective during the brain growth stages" (p. 344). The educational needs of the developing child are specific for the developmental stage—ranging from emphasis on speech, vision and hearing in the critical 2-4 year stage, to "inductive reasoning, creative thought, or divergent thinking" (p. 356) at the newly recognized fifth stage observed in college students. Inappropriate stimulation during the "plateau" periods as exemplified by Head-Start efforts at age 4-6 are non-productive, and Epstein suggests that during these phases "the child should be exposed to large amounts of information and to a wide variety of direct experiences with nature, science, people, and work . . . enlarging the experience base and avoiding pressure for elaborate inferences or interrelationships of such experiences. . . . Furthermore, these would be periods for perfecting the long neglected memorization skills" (p. 364).

There is a sexual dimorphism in brain development, the most rapid spurt for girls being around age 11, whereas that for boys is around age 15. The curricula should be modified to provide a more intense and complex input for girls at this earlier age.

The author's inference from these studies is that "by analogy, the role of intellectual experience or learning is to select among existing networks created by the genetic apparatus during brain development. If the complete spectrum of needed experience is not available to the organism, it loses forever the possibility of having those functions that are operated by the lost network. It is possible that during later development another network may take on the lost function, but this is likely to be a secondary strategy of lower effectiveness. In this way, we can understand the role of experience in shaping the minds of men and the drastic consequences of lack of experience or of improper balances of early life events" (p. 354).

"The idea is that education, better called schooling, should be aimed at helping children arrive at biological and mental checkpoints with the proper biological and mental equipment to enter the next stage and to accomplish that stage at a suitable rate. This gives an internal rhythm to schooling strategies. Once a stage has been reached, the new competencies should be extensively utilized to acquire the new and detailed understandings of many

processes and subjects that have become accessible to the newly upstaged mind" (p. 367).

The remaining five chapters of this remarkable symposium are devoted more specifically to the question of the organization of cognitive functions within the brain and of deviations in these organizational patterns among children with learning disabilities.

In the chapter on Language and the Brain, K. M. Heilman describes the anatomical basis of the human communication system; analyzes specific forms of communication disorders; and touches upon the remarkable capabilities for recovery of language function in brain-damaged children. It is an excellent, brief, but comprehensive review of current knowledge in this field. The enigma of recovery of function is further elaborated on by R. Rudel in Chapter VII, "Neuroplasticity: Implications for Development and Education." Citing evidence from animal experimentation and clinical observations, Rudel focuses on the question, "What is the extent of recovery of function in the brain and in what way does that recovery differ for organisms of different sex and at different stages of development?" (p. 270). Rudel suggests three possible courses for deficits after brain injury. Deficits either "(a) appear early and disappear, (b) are apparent at all ages and after early and late lesions, or (c) are apparent only after a delay" (p. 273). Sensory deficits appear to be more prone to recovery than do those of motor systems. For many types of deficit, the earlier the insult, the less evident the impairment. However, boys, who mature later than girls, appear more vulnerable for some forms of deficit. Experiments in monkeys suggest that this may relate to an earlier maturation of the frontal lobe in males.

Of special importance to education is documented evidence that "recovery of function after brain damage is enhanced by experience which, at the time it is being offered, does not appear to be having any effect. 'Unsuccessful training at one stage of development may ultimately be of decisive effect . . . at later stages.' " "Children with evidence of early damage, or those genetically or otherwise at risk for dyslexia, should be given extra help with language, sequential ordering, and memorization before reading is ever required of them" (p. 291). As noted by Heilman, children show a remarkable ability for recovery of language function after injury to the left cerebral hemisphere—a capability not shared by adults. This may reflect some disinhibition of the right hemisphere which permits it to develop an ability ordinarily suppressed by the dominant (?) left hemisphere. However, the recovered functions in such individuals show

characteristics typical of right hemisphere processes, and in addition there are serious residual impairments of other functions such as serial ordering, analytic attention to detail, and speed of response. Through analysis of a series of case reports of damaged adults with aphasia and of children with developmental language disorders, Rudel concludes that "dysphasia and dyslexia, seen clinically and experimentally, appear to have the same concomitant disturbances in the adult and child, whatever their diverse antecedents" (p. 307).

From the above studies of the organization of language functions in the brain, there can be no doubt regarding the importance of asymmetric representation of cognitive functions in the brain. However, it is for M. Kinsbourne and M. Hiscock—"Cerebral Lateralization and Cognitive Development"—to disclose how insecure is our knowledge of the relation between cerebral lateralization and learning disabilities. Our inability to come to grips with this central problem stems from four questionable basic assumptions.

(1) We have assumed a precise definition of "learning disabilities." Clearly we are not dealing with a single entity. Attempts to define subgroups have failed—"Six different classificatory schemes . . . were proposed by contributors to a single conference on the neuropsychology of learning disorders" (p. 179). Studies attempting to correlate handedness with learning disabilities must relate to a definable entity.

(2) We have assumed agreement on what we mean by "cerebral lateralization." There is a distinction between "cerebral dominance" and "cerebral lateralization." Furthermore, the relationship between such external features as handedness and eyedness and the actual location of functions in the brain is very unclear. Even such sophisticated modern techniques as dichotic listening are unreliable indicators; for example, dichotic tests indicate left hemisphere dominance for language in no more than 80 percent, yet we know speech is left-centered in well over 95 percent of persons. Perceptual and cognitive asymmetries show the fluctuating characteristics of functional rather than anatomically based phenomena. It is the authors' belief that "cerebral specialization influences perceptual asymmetry in a way that is fundamentally different from that depicted by a structural model. A structural representation of the human (or subhuman) nervous system fails to consider that the organism is more than a pre-programmed, reactive device that responds to environmental stimulation in a largely mechanical fashion. On the contrary, the organism's behavior is characterized by properties we may call selectivity, attention, expectancy, planning, etc. Full recognition of the flexibility and adaptability of human behavior leads to a model of hemispheric specialization that can account for

the 'inconsistencies' of perceptual symmetry described above" (p. 199).

"This model is based on the proposition that the fundamental role of each cerebral hemisphere is the direction of orientation toward the contralateral side of space. Differential activation of the two hemispheres produces an overt or covert shift of attention away from the side of the more highly activated hemisphere" (pp. 199–200).

(3) It is commonly assumed that the most prevalent pattern of cerebral organization (left lateralization of language) is optimal, and that its reverse (left handedness) would contribute to cognitive inefficiency. However, in spite of the strong feelings of experienced clinicians (see M. Denckla below) statistical analysis of large groups of dyslexic individuals are contradictory, and in general fail to support this thesis. In one especially large study, "the right and left handed children were almost identical in average performance on verbal and non-verbal tests" (p. 206). The problem is further complicated by inclusion within this group of "pathological" left handers—right handed persons who have shifted over because of injury to the left side of the brain and whose cognitive deficits may stem from the original injury rather than from the atypical laterality.

(4) Inherent in the incomplete lateralization theory is the assumption that cerebral specialization develops over time. Recent studies demonstrating anatomical asymmetries even prior to birth, postural asymmetries of infants, evoked potential studies, and infantile perceptual studies, all raise the question of the validity of this concept, and suggest that "brain function is lateralized from birth, if not earlier, and that language does not become increasingly lateralized" (p. 220).

In short, the authors find that there are flaws in each of these four crucial assumptions underlying the thesis that cerebral asymmetries are related to learning disabilities, and they conclude that "the laterality of language representation probably has no relevance to language performance" (p. 221). They point out, however, that this conclusion does not rule out the possibility of delayed left hemisphere maturation in children with language disorders of some kinds.

This reviewer would agree that the methodological problems outlined by these authors are such that it has not been possible to prove a relationship between asymmetries of brain function and dyslexia. However, these same problems have also prevented this thesis from being disproven. Furthermore, there is much more to the asymmetries of brain function than simply laterality of language.

In Chapter III by W. C. Wittrock, dealing with education and the cognitive processes of the brain, the major focus is on individual variations in cognitive style—the way in which the individual interacts with the stimuli

from his environment. The cognitive processes include selective attention, imagery, verbal encoding, memory and retrieval, and the author postulates three important principles for his analysis of the relationship of these processes to education.

(1) For educational research, process-oriented paradigms are useful in the study of the ways human learners construct meaning from instruction.

(2) Cognitive functions cannot be reduced to neural structures, but they can be understood better by relating them to other contexts such as neurological models of the cognitive processes of the brain.

(3) The importance of the mental elaborations of the learner must be recognized.

In studying the ways in which the brain actively constructs models of the world, and develops its own meanings from the information it receives, one cannot overlook the important differences in the way information is handled by the right and left cerebral hemispheres. The left hemisphere concentrates on verbal-sequential analysis, the right on a Gestalt type of organization through which the parts acquire meaning through their relations with other parts . . . "it is not only the verbal or spatial mode of the information, but more importantly, the type of organization or transformation performed upon it that characterizes its constructive and remembered meaning (p. 65) . . . . The hemispheric functions are distinguished more by the way they organize or represent information than by the type of information they organize (p. 75) . . . . The so-called dichotomy between the hemispheric functions probably results from a slight advantage one strategy has over the other, which is sufficient to produce specializations of some functions" (p. 66).

This dual process model of encoding appears to have its counterpart in normal as well as learning-disabled children. "Teaching strategies which elaborate verbal information in a synthetic spatial or imagery stra egy can facilitate memory with normal lea.ners and with patients with left (cerebral) lesions" (p. 75).

Processing strategies change with age. There are differences according to handedness and according to sex, but although the organization of the cognitive process and the strategies of learning may differ among these groups, there is no evidence of correlation with educationally significant deficits.

However, there are individual differences in cognitive style, and examples are given to demonstrate enhanced learning when teaching strategies are matched to the individual's method of information processing.

In summary, "The recent research on encoding and on hemispheric processes implies that the brain constructs meaning in at least two different

ways, by imposing analytic and holistic organizations upon information. The extensions of this important finding lead to curricular design, the sequencing of instruction, and the learners' elaboration of the information by use of different organizational strategies" (p. 100).

"One implication from these findings is that instruction should begin with careful observation of learners, their constructive processes, and individual differences (p. 101) . . . . From an understanding of these processes, teachers or therapists can begin to construct differentiated instructional treatment appropriate for different children" (p. 96).

"Individual differences" is also the theme of the chapter on "Minimal Brain Dysfunction" by M. Denckla. The chapter starts with a refreshing defense of the much beleaguered term M.B.D.—after all, what are we talking about if it is not the brain and its functions? But M.B.D. is not a diagnosis—merely a way-station or sign-post indicating the direction in which we must proceed for more precise understanding and definition of the problem. The author then deals with the two most common manifestations of M.B.D.—dyslexia and hyperactivity—and presents in tabular form a list of clinical syndromes falling within these two general categories. Among these are some showing "subtle but classical neurological deviations in examination findings which implicate lateralized or even more restricted focal acquired brain damage or dysgenesis" (p. 234). There follows a precise listing and description of the "soft signs" useful in the recognition of this group. These patients, with evidence of brain damage, are contrasted with those whose clinical syndromes present as developmental dysfunctions —lacking evidences by history or examination of brain injury. For them, the term "dysfunction" is an honest recognition of our lack of knowledge of their true causes. A number of subgroups may be recognized—some apparently due to variations of cerebral organization. Starting with the premise that "school favors the right handed female," Dr. Denckla presents a strong case that handedness and sex differences *do* bear some relationship to learning problems in the developing child. Calling upon a wealth of clinical experience, she provides practical suggestions for management, her thesis being that because of the diversity of syndromes encountered "the teacher must become a clinician treating the child, rather than a teacher who knows a certain age group developmentally, or a certain body of subject matter" (p. 258). The clinician must be aware of each child's "case." The concept of individualization bears little sympathy for the current emphasis on "mainstreaming." "The whole concept of mainstreaming is meaningless if we continue to insist that poorly organized children go in and out of resource rooms that, when compared to an old fashioned self-contained classroom, are almost like Grand Central Station. We are demanding

navigational and organizational skills from the very children who most lack such skills. There is no way to avoid the need for more adult supervision and more adult time and effort in the treatment of these children" (p. 266).

In the final chapter, "The Implications for Education," the editors, J. S. Chall and A. F. Mirsky, highlight four recurrent themes of this symposium: the importance of environment in the development of the brain; the importance of timing; the interaction of aptitude and instruction; and the role of cerebral lateralization in human cognition and in learning style. "These concepts deserve implementation in the classroom, but only on an experimental basis and not in disregard of all we have learned in the classroom and in educational research about teaching and learning. Appropriate implementation of this new knowledge will require collaboration between neuroscientists and educators—a collaboration that might help in the pedagogical effort designed on the basis of how *each* child is growing and maturing [and] on each child's talents and weaknesses" (p. 378).

I hope that in this review I have managed to indicate the wealth of information and the breadth of vision that has been achieved by assembling this multidisciplinary panel. Each looks at the function of the brain from a different point of view. There are divergent, often conflicting conclusions. But through it all are several powerful themes: The beautiful diversity of the human mind—its resiliency and responsiveness to appropriate stimulation —the essential role of intervention.

We are indebted to Jeanne Chall and Alan Mirsky for their skillful assembly of this diverse material, and to the National Society for the Study of Education for sponsoring this timely publication.

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The following review by Professor Chall of the books by Bloom and by Cross, which was originally published in the *Harvard Educational Review*, Vol. 47, No. 3, August 1977, is reprinted here with permission.

Human Characteristics and School Learning, by Benjamin S. Bloom. 1976. New York: McGraw-Hill. 284 pp. $10.95.

Accent on Learning, by K. Patricia Cross. 1976. San Francisco: Jossey-Bass. 291 pp. $10.95.

These are two of the most challenging yet optimistic books to have appeared in a very long time. Both are concerned with students who fail but are passed on through the elementary grades into high school and, in more recent years, passed on to college. Bloom's concern is with failure at all levels; Cross is concerned mainly with the "New Students" in college—those from the bottom third in high-school achievement, who would not be in college if it were not for open-admissions policies.

Both books offer solutions to this major educational problem through learning and particularly through school learning. They represent a major departure from the studies headed by Coleman[1] in the 1960's and Jencks[2] in the early 1970s which consistently found that social, cultural, ethnic, racial, and linguistic factors predict school achievement best and would have to be changed to reduce school failure. Bloom and Cross argue forcefully—from their own work and the research of others—that early school achievement is essential for later school achievement, for entrance into a job, and for success in that job. Although both writers acknowledge the importance of family and social factors in school and later success, each concludes that most student failure can be overcome through adjustments of the learning conditions in school.

Teachers, administrators, and educators should be encouraged by these books, although carrying out the school-based solutions proposed will not be easy. It will, however, not be necessary for educators to turn themselves into political activists or social workers to improve failing pupils' achievement.

Both books are revolutionary but in different ways. Cross calls for many changes in the conditions of learning for the failing "New Students" and for changes in curriculum and in jobs. Bloom is perhaps more revolutionary. Although he leaves decisions on curriculum to those in policy positions, he states in a low-keyed manner the daring thesis that most can learn what only some now learn: "Most students can attain a high level of learning capacity if instruction is approached sensitively and systematically, if students are helped when and where they have learning difficulty, if they are given sufficient time to achieve mastery, and if there is some clear criterion of what constitutes mastery" (p. 4).

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[1]James S. Coleman, Ernest Q. Campbell, Carol J. Hobson, James McPartland, Alexander M. Mood, Frederic D. Weinfeld, and Robert L. York, *Equality of Educational Opportunity* (Washington, D.C.: Government Printing Office, 1966).

[2]Christopher Jencks, Marshall Smith, Henry Acland, Mary Jo Bane, David Cohen, Herbert Gintis, Barbara Heyns, and Stephan Michelson, *Inequality: A Reassessment of the Effect of Family and Schooling in America* (New York: Basic Books, 1972).

Acknowledging the influence of John B. Carroll's school-learning model,[3] Bloom presents results from ten years of his work and the work of his students on mastery learning. Together with other microscopic learning experiments and large-scale national and international studies of aptitudes and learning, these studies form the basis of his Theory of School Learning —a theory to predict, explain, and modify individual differences. Bloom's book is, for all purposes, a development of this theory, the aim of which is a system of schooling virtually error-free or at least with a significant reduction in error.

According to Bloom, the theory is value-free and should be judged mainly on its effectiveness for predicting and accounting for individual differences in learning in diverse schools, curricula, and countries. Although the theory is value-free—that is, it can be used in schools that have different values, objectives, and methods—the author states simply and clearly that he is not. On many occasions we are presented with his own values—for example, that smaller individual differences in learning are to be preferred to larger individual differences and that a system of schooling with a minimum of error is to be preferred to one with a maximum of error.

According to Bloom's theory, if individual differences are to be minimal and if most students are to learn what only the current achievers now learn, care must be given to the three independent variables for each individual—entering skills, motivation, and appropriate instruction. With regard to a learner's entering skills, Bloom believes that the experiences in the home and in the larger society must be considered along with the previous school learning. Generally, these variables are more predictive than such static variables as socioeconomic status, education of parents, and ethnicity. Home experiences can be changed, Bloom asserts, if parents are informed of what the more enhancing experiences are. Bloom puts major emphasis, however, on the school even for developing cognitive entering behaviors.

Bloom emphasizes, therefore, that mastery learning or remedial instruction needs to be given at the earliest possible time. In addition, Bloom is mindful that the success from mastery learning, which has been demonstrated in research, is possible only when an entire school makes provision for mastery and individualized learning. Results will not be as great if only a few teachers adopt it.

The crucial importance of previous learning for later learning is brought out most clearly in the case of reading comprehension. Bloom synthesizes

[3]John B. Carroll, "A Model of School Learning," *Teachers College Record*, 64 (1963), 723–33.

the findings from numerous studies that have correlated children's reading achievement in the early grades with their achievement in later grades. The correlations are remarkably high from the first grade on. Indeed, by the sixth grade, reading achievement is highly correlated with most other academic achievement, with high-school grades, and with college matriculation. Bloom concludes that for such "generalized cognitive entry behaviors" as reading comprehension a high level of competence or even overlearning should be sought for all.

Bloom thus brings theoretical and empirical support to the long-held view that reading is the key to most school learning; further, he suggests that, without remedial efforts, a significant and persistent gap in reading achievement forebodes continued academic failure. Bloom's data also confirm, in principle, the compensatory efforts of the 1960s—the emphasis on reading of Title I, Headstart, and Right-to-Read, as well as the concern with dyslexia and adult illiteracy. The data do not support the position of some prominent intellectuals who wrote during the 1960s that reading may be overrated and that, in an age of electronic media, teaching reading to those who find it especially difficult to learn may be an imposition.

That assistance to those who find difficulty in learning to read should start early is emphasized throughout Bloom's book. In one section Bloom describes with great poignancy the frustrations of a first-grader who fails to learn how to read and the snowballing effects of this experience on later efforts to learn to read, on learning in general, and on the child's feelings. For such children Bloom recommends immediate help. This will not sound revolutionary to those familiar with the practices of good private and public schools. Most private schools offer diagnostic and remedial services either covered by tuition or at extra expense to the family. Good public schools give predictive tests in kindergarten and provide special help as early as kindergarten and first grade. But to provide such services for *all* children would be revolutionary. In taking this position Bloom supports the thrust of the learning-disability movement, which has been proposing early testing and special remedial help for children with extreme learning difficulties.

Many researchers hold that it is counterproductive to call attention to the differences in reading and general academic achievement among students of different socioeconomic status (SES) and ethnic groups. Unfortunately, this attention has too often been misinterpreted to mean that some groups are lacking in general ability. Bloom confronts this issue by taking great care to demonstrate that the differences found are not inherent but can be explained by widely differing amounts of environmental stimulation.

Where there is a rich environment, children learn well regardless of class and ethnicity.

Whether the usual SES variables or the more dynamic environmental factors are considered, it is generally the children of the less affluent families who have been less prepared for school. All who stumble and fall will benefit from application of Bloom's theory (the children of the rich are not exempt), but it is the children of the poor who will probably benefit most. If applied widely, Bloom's theory can be a tremendous force for social mobility.

Bloom does not stop with an espousal of a theory but also pursues its implications. For example, if his recommendations are widely implemented and all children succeed in school, enter college, and graduate, what will society do with so many doctors, scientists, poets, and writers? In considering this question, Bloom asserts that all will have to learn for themselves rather than for jobs and status alone.

As a final illustration of Bloom's thought, I present this excerpt from his last chapter:

> If humans are born equal or can become equal with regard to learning, then the home and the school have responsibilities far greater than they have assumed in the past. If equality of learning is possible, then the selective function of schools must be largely abandoned in favor of the developmental functions which schools must increasingly serve. (p. 209)

Although Bloom's proposals for change in the schools remain within the generally accepted goals of school learning, Cross proposes the need for more drastic and immediate changes in goals and curriculum. This is due, perhaps, to her major concern with the college level, whereas Bloom focuses on elementary and secondary levels. In contrast to Bloom, Cross's book is looser and more wide-ranging. This stems partly, I think, from the relative newness of her topic, the "New College Students." In both books, however, one is aware of a passion for hard evidence, a love for learning, and a compassion for those who find it difficult to learn.

Cross opens with a statement of values and purposes: "American higher education has worked hard for the past quarter of a century to achieve educational opportunity for *all*. It looks very much as though we shall spend the remaining years of this century working to achieve 'education for *each*' " (p. 3). According to Cross, in the 1950s and 1960s, we were so obsessed with attaining minimal educational rights for everyone that we

gave little attention to maximizing learning for each individual. While access and remediation are laudable goals, the minimal standards implied by these concepts are not sufficient for higher education. Educational opportunity implies the right to develop one's talents to maximum effectiveness: "The central thesis of this book is that education has the obligation to offer *all students the opportunity for high level achievement*. Attaining this goal requires some improvement of instruction and some reshaping of the curriculum" (p. 4).

Cross synthesizes the relevant literature and recommends changes in the education of the New Student. Most are first-generation college students and Caucasian (mostly sons and daughters of blue-collar workers). About a quarter are Black, and about 15 percent belong to other minorities. Overrepresented among the New Student population are Black Americans, Mexican-Americans, and American Indians. Although New Students tend to come from the low socioeconomic levels, not all are from "disadvantaged homes." About one-fourth of the low-achieving students entering open-door colleges are children of fathers who attended college, but these students' "sense of failure is just as personally destructive as that of their financially disadvantaged peers" (p. 7).

Supporting her position with recent data, Cross argues convincingly for the New Students' interest in, and capacity for, a college education. Conservative and suspicious of "innovative" education, these students want from college what they see others obtaining—better jobs, more money, higher social status.

Among the many proposed solutions for improving the education of these students are special tutoring, mastery learning, and better learning of general entry skills, particularly literacy. In discussing these solutions, Cross draws on her rich experience and knowledge of the various programs designed for the New Student. She points out that the remedial and developmental education programs of the 1960s suffered because no one seemed to know how to compensate for the "disadvantaged" students' lack of adequate education. Remedial courses were made to look as much like "regular school" as possible. Premature claims of success were common. Those who suggested the efforts were *not* successful were likely to be called "racists."

Cross would alter remediation and development programs by radical changes in curriculum and in academic requirements. With regard to remediation, she cautions that there is much that we do not know, including what skills are necessary for academic survival. She emphasizes that

research is needed in this area and presents excellent summaries and interpretations of the current research. To change curriculum, Cross would broaden the goals of higher education to include knowledge of people and interpersonal skills and ability to work with objects and materials, as well as the traditional knowledge of ideas. Concerning academic requirements, Cross advocates reducing them for the new student.

While acknowledging that with enough time and money these students may be brought through the regular curriculum, she asks, to what end? Like Bloom, Cross faces the question of what will happen to the demand for college education if high-level jobs are not available. She is optimistic about jobs for the New Student degree holders, since she expects jobs will be more plentiful for those strong in interpersonal skills and practical knowledge. Along with Bloom, however, she asks about the possible devaluation of the college degree when most people have one. Her answer, like his, is that "the emphasis must shift from the value of the credential to the value of the knowledge and skills gained through college" (p. 7).

It seems to me that both Cross and Bloom underplay the effects of such changes. Although learning for the sake of learning may appeal to some, particularly to those from more affluent and more educated families, it is difficult to envision the wide acceptance of this notion of education among groups who are entering higher education for the first time. These groups primarily perceive a college education as a means to better paying and more prestigious jobs. How will they feel and how will they act when the rules change? What will happen when there are not enough professional jobs for all college graduates? Since some professionals will always be needed, who will fill these positions? Will selective criteria still be used, or will the criteria be changed from high aptitude scores and grades to amount of time taken to learn? That is, will professional success come to those who reach the highest levels of achievement irrespective of the amount of mastery learning or remedial instruction needed, or will fine distinctions be made among students according to who completes the work fastest?

In spite of and because of these kinds of questions, both books have much to say to education researchers, theorists, policy makers, and practitioners. Both authors have faith in the ability of schools and colleges to educate those who have heretofore failed or dropped out. This faith sets them apart from many educational reformers, romantics, and prophets of the 1960s. To substantiate their faith, they present hard data and offer procedures that have been demonstrated to work. The realistic solutions Bloom and Cross present will not be easy to carry out; yet, if they are widely

applied, the nature of learning in schools and colleges will be vastly changed, as will the students and teachers who apply them.

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Toward a Literate Society: a Report from the National Academy of Education, John B. Carroll and Jeanne S. Chall (eds.). New York: McGraw-Hill. 1975.

This volume, published in 1975 but not previously reviewed in the *Bulletin of the Orton Society*, is one we should all be aware of and read in selectively. Of varying quality (as in all such collections) and survival value, the papers which form its chapters will also differ in pertinence to individual readers. Still, some are of general merit and justifiable longevity.

In a sense, this work, dedicated to the memory of the late U.S. Commissioner of Education, Dr. James E. Allen, Jr., represents the program he launched toward universal literacy, now well-known as "The Right to Read." It is also, in a sense, his legacy to his country for despite his dismissal from office he remained active in promotion of the Committee on Reading appointed by the Executive Council of the National Academy of Education and was reviewing its report just before his death (in an airplane accident) in 1971. (Members of the Orton Society will remember his delightful presentation at the banquet of its annual meeting at the Shoreham Hotel in Washington just after his politically-based dismissal—"something happened on the way to the Shoreham!" (See *Bulletin*, Vol. XXI, 1971.)

The original papers in this report were read at a meeting in 1970, with some revision of all but one of them for the current publication edited by two leading participants, John B. Carroll and Jeanne S. Chall. "Report of the Committee on Reading, National Academy of Education," which forms the first chapter, is still an excellent point of departure for a study of the problem of literacy and what should be done about it. Events of significance, legal and pedagogic, keep occurring so that any report is somewhat outdated before its ink is dry, but that is in the nature of the case. The essential analyses and prescriptions are still valid, even though some of

them have received important recent attention, as in Federal Laws 504 and 94–142, for example. There is still a long way to go!

One of the 12 commissioned papers printed here (and the only one not revised) is Eleanor Gibson's stimulating research report on the nature of reading, which continues her work reported in *Science*, May 1965, and reprinted for *Bulletin* readers in our Volume XV of the same year. Except for denial of the value of consciousness and use of separate phonemes (since demonstrated to be desirable in Liberman's research—*Bulletin* XXIII and elsewhere), the author's recognition of the importance of what Chall has called "the code emphasis" in teaching reading supports and is supported by our experience. Particularly valuable, it seems to me, is her stress on the intimate relation of spelling patterns to language skill learning, connecting as it does the pronunciation of words and their morphemic, syntactic, and semantic cues to increasing competence as one learns to read. There has been too little *basic* research into the nature of reading and its mastery, so we welcome every contribution from Gibson and her cohorts as progress and stimuli to further advances.

Other chapters cover subjects of wide range. There are the relatively timeless definition of literacy (John R. Bormuth) and consideration of the motivational factors—the universal aspirations involved in learning and teaching—well-treated by Lauren Resnick and Betty Robinson. More date-related reports on the state-of-the-art include description of practices in teaching beginners (Helen Popp); adults (Rose-Marie Weber and T. A. Ryan—two chapters); bilingual learners (Vivian M. Horner); through TV (Markle, Markle, and Macoby), with an especially interesting analysis of "Sesame Street" and "The Electric Company" (Gibbon, Palmer, and Fowles); and the systematic use of extrinsic rewards (Norris G. Haring), the necessity and desirability of which is not universally accepted by the other contributors. Political implications (Saxe and deLone) and economic perspectives (Brown and Hentschke) of the national effort to promote literacy round out the report.

If, as I did, you missed this volume when it came from the press, you will find it well worth getting hold of while it is still relatively timely, for it marks an important forward step in the national recognition of the literacy program and action in the interest of every citizen's Right to Read.

—Margaret B. Rawson

A COMPARATIVE REVIEW

Language and Learning, A Special Issue. *Harvard Educational Review*, Spring, 1964.

Reading, Language and Learning, A Special Issue. *Harvard Educational Review*, August, 1977.

The planners and editors of these two issues of *The Harvard Educational Review*, despite the minimal carryover of names, are obviously of the same linguistically-based ideological family. They also express changes in the state of the art which have taken place as knowledge and interests have developed in the 13 years between their publication dates.

The authors of the major papers in the two volumes are all different, with only Courtney B. Cazden and Jeanne S. Chall appearing as reviewers in both. Helen Popp, a 1964 reviewer and co-editor, provides, in the 1977 Preface, a specific statement of the common concern of both issues with language as a basic attribute of learning and living. She also points up changes in the knowledge underlying linguistic theories and applications and, especially, the increasing emphasis on the skills of literacy as a world-wide focus in meeting educational needs and practicies.

Much that was controversial about linguistic structures, language development in young children, the teaching of grammar, and the like, in 1964 seems now less in evidence. On the other hand, the acquisition and application of the skills of reading are treated from widely differing viewpoints.

David R. Olson, in the lead article of the 1977 issue, presents a statement of the difference between the language of "utterance" and that of "text." The former, he says, serves primarily to convey meaning to listeners in memorable form, with the support of the concurrent relationships of speaker and listeners in facial, tonal, bodily and social interactions. It need not be so exact in its denotative function, but depends far more on an unexpressed commonality of connotations and an often subtle conveyance of feeling and emphasis. In its printed form the textual material which uses conventions of literacy has necessarily come to rely more and more on distinguishing its meanings through the exact use of words and the grammatical, logic-determined formulation of thought. This involves nice discrimination in both expression and interpretation based on knowledge

and skill in both writer and reader, whether in the exacting statements of science or, at the other extreme, in the conscious use and appreciation of metaphor in poetry. A major objective in developing mastery of the written language is to shift the achievement of communication from reliance on cues to anchoring meaning as specifically as is possible in text which is independent of the time, place, and circumstances of speech. Meaning becomes inherent in the text itself, and with the skills of literacy the reader has direct access to it.

Hence, a major objective of education in Western culture through schooling is to help the learner change, with some degree of systematic progression, from a reader of the understood spoken language which he brings to school to an understanding reader, speaker and producer of the written language of a literate, technological society.

There are philosophical as well as pedagogical implications here having to do with the meaning, truth, and function of language in its parallel, related and differing forms in "utterance" and "text." There are many other insights, too, in this paper which is itself an excellent example of the textual mode delineated by the author. In fact, if I were pressed to select just one paper from this collection for its contribution to both a fresh alignment of thinking and to clarity of expression, Olson's "From Utterance to Text: the Bias of Language in Speech and Writing" would be my unequivocal choice.

Whereas in 1964 the nature of reading, the processes of its learning and teaching, and the difficulties encountered in the achievement of individual and universal literacy received very short shrift, many of the authors in the current volume are much concerned with these issues. Emphases in papers and critical reviews vary widely, from the historical to the theoretical, the pedagogical and the clinical. They are far from being in agreement except as to the importance of the subject for learners of every age in education.

When I read Frank Smith's article on "Making Sense of Reading—and of Reading Instruction," I think how far the world has still to go in realizing what so many of us have long taken for granted and used as a foundation stone in teaching. He argues, with our full acceptance, that children must see "written language as meaningful," and as "different from spoken language," and he insists that it is *not* (my italics—he does not say "not only") a matter of decoding, as he beats the dead "kuh-a-tuh" and engages in sweeping inaccuracies (it seems to me) about children's responses to systematic teaching about the realities of English. On the other hand, I find myself thinking that the world *has* moved when Frank R. Vellutino can

consider "Alternative Conceptualizations of Dyslexia" without apology for using the term. He quotes old and new findings from several excellent studies which should lead readers to consult these sources for themselves, a course recommended by one who has not found all of Vellutino's reasoning and conclusions consistent with her own study and experience.

Finally, Old Timer Magdalen D. Vernon's overview of "Varieties of Deficiency in the Reading Process" seems as clear and cogent a sorting out of the groups of children with a variable assortment of language disorders as I have seen recently. It is my second choice for a billet on "the most useful papers" shelf.

Altogether, the 1977 round-up by the *Harvard Educational Review* seems to show real movement toward growth of understanding of the relation of reading to the rest of language and learning. Perhaps before 1990 we may have another equally fine compendium which will add more of the dimension of written expression—spelling and the skills of verbal formulation—as important to linguistic education and growth.

—Margaret Byrd Rawson

REVIEW OF TWO GRADUATE STUDENT STUDIES ON SLINGERLAND THEORY AND PRACTICE

Annete, Sister Mary, S. N. D. 1977. Positive Self-Concept Assures SLD Children's Academic Success. Unpublished Master's Project. Belmont, California: College of Notre Dame.

White, Nancy Cushen. 1977. Evidence of the Existence of Uniformity in the Decoding of English Words. Unpublished Master's Project. Belmont, California: College of Notre Dame.

Most persons who have been involved actively in the tutoring of individuals with specific language disability have personally witnessed the change that occurs in an individual's self-concept as he finds himself learning that which he thought he never could. As tutors, we have become convinced of the value of a strong program of phonics, based upon a hierarchy of difficulty and of common usage. How frustrating it can be, then, to be challenged to prove statistically that which one knows from

experience to be true. It is a pleasure to be able to report that initial studies have been made in these areas as portions of the program leading to the Master of Education degree in Slingerland Theory on Language Disability, offered through the College of Notre Dame, Belmont, California.

Beth Slingerland, in her book, *A Multi-sensory Approach to Language Arts for Specific Language Disability Children* (Cambridge, Massachusetts: Educators Publishing Service, Inc., 1971), describes the rationale for her techniques as follows: "The teaching technique to be presented herein is for use as a preventive or early remedial measure with specific language disability (SLD) or specific developmental dyslexic children in the primary grades. Realizing the impossibility of giving individual instruction to most of the children in public school classroom situations, the technique was developed as a group therapy. It is an adaptation for classroom use of the Orton-Gillingham approach to reading, writing, and spelling."

School districts that elect to establish such classrooms screen children for assignment to classes staffed by teachers who have been trained to employ Slingerland's methods. On the basis of the screening, those children are selected whose performance indicates that they might have difficulty with language arts. For most districts, an attempt to evaluate ability level is made without involving an extensive and expansive individual intellectual assessment. Where children's disabilities are severe, a complete test battery might be employed. For the most part, these classes are part of a general education curriculum, although some teachers of children with learning disabilities also have studied these techniques and employ them in their special education classes. Ideally, the children remain in subsequent grades with Slingerland-trained teachers as long as their need exists. When they have been taught how to cope with their disabilities, they may be reassigned to regular classes.

The first of the two studies reported here was a master's thesis study conducted in a Slingerland classroom in St. Stephen School, Cleveland, Ohio, over a period of several months by Sister Mary Annete, S.N.D. She reported several positive trends in her paper entitled, "Positive Self-Concept Assures SLD Children's Academic Success." Sister Mary Annete's major hypothesis was that there would be a positive shift in attitude on the parts of both children and their parents as a result of experiences in a classroom using the Slingerland Multi-sensory Approach.

A ten-item questionnaire was distributed to 45 parents in October and again in April of the same school year. The questions related to the parents' opinions about their children's self-concept and to parental attitudes about

the child and about the act of reading. There are weaknesses in the wording of some items on the questionnaire, leading to the shaping of parental responses, e.g. "I have accepted my child's ability to learn at his/her rate without undue pressure." Who would answer "never" to that item?

Nevertheless, some interesting trends were seen. For example, in October, 1976, 42.5 percent of the parents indicated that they had never seen in their children a positive attitude toward their achievement in school, while 15 percent found that they "Always" or "Often" did. By way of contrast, in April of 1977, for the same item, only 2.3 percent now felt they never saw a positive attitude, while 72.1 now felt that they "Always" or "Often" did. Parents also felt that other members of the family were better able to accept the child's learning style after the year in the Slingerland class.

With such a shift in perception on the part of his family, it is not hard to imagine the release in tension and pressure to learn which the child must have felt. Our concepts and feelings about ourselves and our worthiness are involved intimately with the way we feel others value or do not value us. A skill we learn, an object we make, becomes worthless if we perceive it as not being valued by anyone. It appeared that a circular influence was developing with this group of children. As a child advanced in the classroom and felt better about himself, so others in the family found themselves better able to accept the child's learning problems, which could only result in that child's continuing to feel more positive about his achievement.

The children's self-attitudes were measured by the Primary Self-Concept Inventory Test (Douglas G. Muller and Robert Leonetti, published by Learning Concepts, Austin, Texas, 1974), a picture test of 20 items, where children marked the picture which best matched the way they felt about themselves.

A retest in April, 1977, indicated a positive shift in attitudes, most particularly with the child's perception of his tendency to succeed or fail, and his feelings about his emotional states. We would assume that, as a child perceived himself more and more as an able learner, he would also see himself as more happy than sad, more not angry than angry. It is pleasant to find some initial research which supports this assumption and provides some data on this aspect of the value of the Slingerland classrooms.

The second study, by Nancy Cushen White, entailed an evaluation of the frequency of certain phonetic structures in the spelling of words. Observation has led most persons involved with the teaching of phonics to the conviction that there is not only a regularity to the patterns found in the

majority of English words, but also that some phonetic structures are more commonly found than others.* Until the 1966 study by P. R. Hanna et al. (*Phoneme-Grapheme Correspondences as Cues to Spelling Improvement*, Washington, D.C.: Office of Education, U.S. Department of Health, Education and Welfare), however, there had been a lack of data to confirm these observations. There have also been differences of opinion among the authors of various phonic programs and basal readers as to the recommended order of presentation of the sounds of letters and letter groupings, with some published programs emphasizing consonants, others starting with short vowel sounds, while still others begin with the various spellings of the long vowel sounds.

Mrs. White is a teacher of a class of gifted, learning handicapped children in the San Francisco school district. In her master's study, "Evidence of the Existence of Uniformity in the Decoding of English Words," she reported on the frequency of various phonetic structures as used in the Ginn 720 Series. The Ginn 720 is a series of basal texts with 13 levels, intended for use in grades one through six. It is not a linguistic program where an attempt is made to keep the phonetic elements uniform, but was developed with emphasis on learning words by sight methods. Phonic instruction, however, is a part of the program. Mrs. White chose this series because she felt that the vocabulary used would be representative of the words in common use in reading instruction in the elementary grades.

From these thirteen levels, Mrs. White compiled a list of 3,644 words, typing each into a computer by syllables. The syllables were coded by the pronunciation of the vowel pattern, with consonants excluded unless they were a part of the letter combination, such as *ank*. Syllables that were nonphonetic according to her series of key word pronunciation were coded as "red flag," or nonphonetic.

Computer analysis of these phonetic elements resulted in some interesting data. By far the largest percentage of words contained syllables with short vowels (vowel-consonants pattern). For example, *e-consonant* was contained in 17.62 percent of the entire word list, *a-consonant* in 16.36 percent of the words, *i-consonant* in 15.23 percent of the words, *o-consonant* in 11.69 percent, and *u-consonant* in 7.88 percent of the total list. Taken

*This observation led to one aspect of the remedial approach advocated by S. T. Orton, J.L. Orton, A. Gillingham, S. Childs, B. Slingerland, and others in what has come to be known as the "Orton-Gillingham" approach with emphasis on the "regular" and most frequently occurring phonemic-graphemic correspondences and syllabic patterns. Slingerland has adapted this approach for use in the classroom.

together, these five patterns were found in 68.78 percent of the total word list. The remaining category most commonly found was the open syllable, with *y* as the leader being found in 7.66 percent of the words. *Vowel-consonant-e* and *r*-controlled vowels, especially *er*, came next in order of frequency.

The statistical treatment of the data was a bit confusing, since the percentages total 182.14 percent, until it is realized that syllables are being compared with word totals. Since many of the words contained more than one syllable, there was duplication of the words used in the syllable totals. The total number of syllables analyzed is not given in the study. It would have been interesting to have the syllable count used as a base for evaluating percentages, in order to obtain a true fraction of the total number of items analyzed.

In addition, since a particular reading series was used in the study, generalization to other series is not possible. Nevertheless, the selection of a series that was not linguistic in design leads one to speculate that the data may be more truly representative of reading material found outside the schoolroom than could have been said of certain other series of readers.

Mrs. White's study contains valuable information on the order of frequency of phonetic elements used in the vocabulary of the Ginn 720 series. It should certainly prove most helpful to teachers using that series in their classrooms. It could also provide guidelines for the order of the presentation of phonetic elements for teachers using other non-linguistic series.

—Genevieve G. Oliphant

Search and Teach, by Archie A. Silver and Rosa A. Hagin. New York: Walker Educational Book Corporation. 1976.

Rosa Hagin and Archie Silver are no strangers to *Bulletin* readers; together and singly, they have contributed a total of seven articles to this journal since 1961. Many of our readers, therefore, are familiar with their long years of research into the nature of dyslexia, their hypotheses about the perceptual and neurological deficiencies underlying learning failure, and their initial and follow-up studies with children in clinics and schools.

Twenty-five years of study and treatment of children at the New York University-Bellevue Medical Center and in the public schools of Manhattan have resulted in *Search and Teach*, a program of identification and intervention for use with children at the end of kindergarten or at the beginning of first grade and directed at the prevention of learning failure. Two separate volumes and the testing and teaching materials comprise *Search and Teach*.

The first book, *Search*, describes in considerable detail the research that led to the development, final construction, validation, and standardization of the scanning instrument. Excellent tables are accompanied by clear explanation of the statistical methodology and analysis. Included also is a clear description of the scanning instrument itself and its rationale. There are ten tests: three of visual perception (discrimination, recall, and visual-motor control); two auditory (discrimination and rote sequencing); two intermodal (articulation and intermodal dictation); and three of body image (directionality, finger schema, and praxis).

Taken together, the ten component subtests yield a total score, used to measure vulnerability to learning failure; individually, the subtests yield a profile of assets and deficits. Silver and Hagin are quick to point out, however, that *Search* has no *diagnostic* significance and that ". . . children so located constitute a heterogeneous group and that clinical services are necessary to tease out individual diagnoses."

In addition to replication of the initial studies (in a number of schools) during the experimental phase and in addition to their correlational studies and factor analysis, Hagin and Silver measured their data for internal consistency, test-retest reliability and standard errors of measurement. Standardization of the scanning instrument was effected with its administration to over 2300 boys and girls, aged 63 to 80 months, in a number of schools in New York and North Carolina (including a wide range of socio-economic levels and ethnic groups) and resulted in conversion of raw scores to stanines for given age intervals. The stanines are used to judge the vulnerability to learning failure in the children surveyed and as an aid to grouping kindergarten children for instruction. The authors warn against rigid interpretation, however, and point out that:

> Interpretation of a *Search* profile requires judgment, familiarity with the processes of teaching and learning, and ability to integrate the data which the testing elicits. Test components should not be interpreted rigidly, nor should recommendations for teaching result in a

> "cut-and-dried" prescription. It is more important to view *Search* results in relation to the child's total personality, the strengths and weaknesses he displays as well as the opportunities he has had for learning (p. 95).

The authors have taken pains to make *Search* easy to use. Directions for administration, scoring, and interpretation are explicit. The illustrations, case histories and explanations should be especially helpful to classroom teachers who, because they lack clinical experience, are sometimes reluctant to use tests that they view as within the province only of psychologists or other specialists.

The second part of the program, *Teach*, describes the learning tasks to be matched to a child's identified strengths and weaknesses. These tasks are organized into modality clusters, e.g., visual or auditory, and are also placed within a coded skills index to allow a teacher to locate the tasks for specific skills development.

Each learning task has a stated purpose and rationale. The authors provide the materials and describe preparation, procedures, and the performance criteria for mastery level. Space does not permit a description here of the many visual, auditory, kinesthetic, and integrative activities and games. It is important to note that language, both receptive and expressive (as well as letters and numbers), is integrated with many of the perceptual and sequencing tasks and is always purposefully directed toward establishing the linguistic competencies and behaviors that underlie successful school learning.

There has been much to criticize in the past about programs of perceptual-motor training that were viewed and used by learning disability teachers as substitutes for "regular" programs of instruction. Theoretical constructs were faulty in some of the programs; in others, little or no valid research preceded their publication. Yet, they were not only used widely but they supplanted, in many cases, the language instruction needed by children who were failing to learn in school. Archie Silver and Rosa Hagin do refer to their teaching program as "perceptual stimulation" but they make it clear that *Search and Teach* is not a method for the teaching of reading and that it is not a substitute for the reaching of reading. *Search and Teach* is intended for "developing the neurophysiological basis for learning."

This program will undoubtedly be seen as a welcome addition to the screening tests and predictive indices now available for early identification

of potential school failure. Unlike many other screening devices, however, it does not stop short with identification; it offers a program of intervention that can enable kindergarten and first-grade teachers to provide systematically the kinds of experiences that seem to enhance readiness for school learning. But this is only a beginning. Even with enhanced school readiness, children still differ in modes and rates of learning. Teachers in the primary grades, therefore, need to learn how to identify entry behaviors and individual variations among young children so that they can match to them the appropriate instruction for that all-important task of the early school years—reading acquisition.

—A. A.

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